



Ralston, Susan (2011) *The impact of thought suppression outside the laboratory: effects on thought frequency, dismissability and distress in an obsessional cohort*. D Clin Psy thesis.

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University
of Glasgow

**The Impact of Thought Suppression Outside the Laboratory:
Effects on Thought Frequency, Dismissability and Distress in an
Obsessional Cohort**

AND CLINICAL RESEARCH PORTFOLIO
VOLUME I

(VOLUME II bound separately)

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BSc (Hons)**

*Submitted in partial fulfilment of the requirements for the degree
of Doctorate in Clinical Psychology (D Clin Psy)*

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July 2011

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Acknowledgements

Firstly, thank you to Professor Kate Davidson for supervising my research. I would also like to thank Dr Andrew McLean for his time in generating ideas for the project and particularly his support during the write-up process. I would also like to thank all the undergraduate students at the University of Glasgow who kindly took part in the study.

I am also very grateful to my clinical supervisors who have shared their knowledge and provided encouragement throughout the training process.

I would also like to thank intake 2008! It has been a great year group to share this experience with.

Most importantly, thank you to my friends and family and finally, to Danny, who has kept me going throughout this process.

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CHAPTER ONE: SYSTEMATIC REVIEW

A Systematic Review on the Impact of Thought Suppression in Post-Traumatic Stress Disorder and Acute Stress Disorder.

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Declaration of conflicts of interest: None

Abstract

Background: Thought suppression is a form of mental control implicated in the development and maintenance of Post-Traumatic Stress Disorder (PTSD) and Acute Stress Disorder (ASD). It is hypothesised that suppression leads to a paradoxical increase in thoughts both during and following suppression, known as the immediate enhancement and rebound effect respectively.

Aims: To synthesise experimental findings on the effects of thought suppression on PTSD and ASD related intrusions.

Method: Literature was searched between 1987-2011 for studies which investigated the effects of thought suppression on the frequency of trauma-related intrusive thoughts. The impact of suppression on other relevant variables such as distress, mood, appraisals and thought control strategy were also considered.

Results: Nine studies met inclusion criteria for review. Taking methodological constraints into account, there was no evidence for immediate enhancement of thought frequency during suppression, with effect sizes (ES) in the *opposite* direction (-0.08 to -0.28). Four studies were indicative of a rebound effect, with only one controlled study demonstrating the predicted effect (ES: 0.30). There was limited support for effects of suppression on distress or mood.

Conclusions: The current literature does not provide evidence for an immediate enhancement effect and offers limited support for the rebound effect in PTSD/ASD. This may, in part, be due to methodological limitations. Avenues for future research and clinical implications are discussed.

Keywords: Thought Suppression; Post Traumatic Stress Disorder; Acute Stress Disorder; Intrusive Thoughts.

Highlights

- Effects of thought suppression in PTSD and ASD were examined.
- No evidence found for ‘immediate enhancement’ effect.
- Weak evidence found for the ‘rebound’ effect.
- Methodological issues in studies to date limit the strength of conclusions.
- Based on current findings, thought suppression may be a helpful short-term strategy.

1. Introduction

1.1 Thought Suppression

Thought suppression is a form of mental control essentially meaning ‘not to think about something’. Unfortunately, our suppression efforts are often unsuccessful and it is now widely believed that thought suppression leads to a paradoxical increase in thoughts. This view stemmed from Wegner et al’s (1987) classic study of thought suppression in undergraduate students. Participants completed two 5 minute experimental conditions in counterbalanced order: (1) try not to think about a white bear (suppression), and (2) try to think about a white bear (expression). Two main effects were demonstrated. First, during suppression, both groups experienced thought occurrences and therefore were unable to suppress fully the white bear. Secondly, in the group who completed the suppression condition first, a surge in thought occurrences was experienced during the expression period. This became known as the ‘*rebound effect*’, meaning an increase in thought frequency following a period of suppression. An additional effect named ‘*immediate enhancement*’ was later coined based on further studies which found that thought frequency increased during the act of suppression (e.g. Lavy & Van der Hout, 1990).

Since Wegner et al’s (1987) original experiments, thought suppression paradigms have been applied to neutral thoughts and also to personally relevant thoughts associated with clinical disorders such as worry (McLean & Broomfield, 2007), obsessional intrusions (Purdon et al, 2005) and traumatic intrusions (Shipherd & Beck, 2005). Results of these studies have been inconsistent in their findings of rebound and immediate enhancement effects (Purdon & Clark, 2000; Purdon, 1999). A meta-analytic review (Abramowitz, Tolin & Street, 2001) of the thought suppression literature as a whole found no evidence for immediate enhancement, but a small to moderate effect size for the rebound effect. However, the generalisability of this review to clinical populations was limited since the majority of studies recruited healthy volunteers. In addition, effects sizes were calculated based on differences between the

suppression and control group and not in the suppression group alone. This prevents examination of the instruction to suppress *in* the suppression group, which would seem of clinical relevance.

Despite these inconsistencies and limitations, the phenomenon of thought suppression is implicated in a number of cognitive theories for disorders such as Generalised Anxiety Disorder (Wells, 1997), Post Traumatic Stress Disorder (PTSD; Ehlers & Clark, 2000), Acute Stress Disorder (ASD; Harvey & Bryant, 2002) and Obsessive Compulsive Disorder (OCD; Salkovskis, 1989). Although intuitively, thought suppression may fit within these models of psychopathology, mixed experimental findings for the rebound and immediate enhancement effects suggest that: (1) the *causal* role of thought suppression in these disorders is weak, (2) methodological issues in the extant research has prevented the detection of effects, and/or (3) thought suppression does not exert its effects on the development and maintenance of psychological disorder by increasing thought frequency, but via its impact on other variables such as distress or thought appraisals.

1.2 Thought Suppression and Traumatic Intrusions

After experiencing a traumatic event, survivors may experience a range of trauma related intrusions such as thoughts, images, impulses and memories. Although most people have the capacity to adapt to the experience of trauma (e.g. Miguel-Tobal et al, 2006) others will suffer from more pervasive symptoms and meet criteria for diagnoses such as Acute Stress Disorder (ASD) or Post Traumatic Stress Disorder (PTSD). Both diagnoses include symptoms of increased arousal, re-experiencing and avoidance which significantly affect functioning (DSM-IV-TR, American Psychiatric Association, 2000). ASD also includes an additional symptom cluster of dissociative symptoms (numbing, depersonalisation, derealisation or dissociative amnesia). A duration of symptoms between two days and one month is required for ASD and at least one month for PTSD. In both disorders, trauma related intrusions can

evoke high levels of affect and distress leading to attempts to avoid thoughts and feelings associated with the trauma.

Given that avoidance is central to the diagnosis of both ASD and PTSD, avoidant thought control strategies such as thought suppression have intuitive links to trauma related psychopathology. Indeed, cognitive (Ehlers & Clark, 2000) and meta-cognitive (Wells, 2000) conceptualisations implicate the role of thought suppression in the development and maintenance of PTSD. According to Wells (2000), maladaptive thinking styles and avoidant coping strategies such as thought suppression interfere with natural adaptation to trauma, thereby preventing the reduction of traumatic symptoms over time. The selection of strategies such as suppression is partially governed by meta-cognitive beliefs held about symptoms, both positive and negative. Once thought suppression is activated, it has a paradoxical role in increasing the salience of trauma material. Given that suppression is likely to be unsuccessful, there is a risk that further thought recurrences will be viewed negatively, as a failure in control. Such negative appraisals may then act to increase anxiety and fuel further maladaptive strategies such as avoidance and dissociation, preventing more adaptive and accurate processing of trauma material. Therefore, according to meta-cognitive models, thought suppression appears to have a central role in the maintenance cycle of trauma symptomatology.

Empirical research supports this role to some extent. For instance, prospective correlational studies have demonstrated a relationship between thought suppression (Ehlers, Mayou & Bryant, 1998), and avoidant coping in general (Gil, 2005), with the development of PTSD. Higher levels of chronic suppression are also associated with greater levels of PTSD (Vazques, Hervas, Perez-Sales, 2008). However, causal experimental paradigms involving a manipulation of thought suppression have yielded mixed findings, with only some studies providing evidence of a rebound effect. Despite these inconsistencies, non-systematic reviews of the literature to date have generally supported the role of thought suppression,

specifically maintaining that suppression of traumatic intrusions leads to a rebound effect (e.g. Gerearts & McNally, 2008; Shipherd & Salters-Pedneault, 2008).

1.3 Rationale for Systematic Review

There is a small literature base on the effects of thought suppression in PTSD/ASD (Gerearts & McNally, 2008; Purdon, 1999; Rassin et al, 2000; Falsetti, 2009; Shipherd & Salters-Pedneault, 2008), but no systematic evaluation of the literature. Although cognitive theories propose a role for thought suppression in the development and maintenance of PTSD and ASD, mixed thought suppression findings along with inconsistent methodologies make interpretation difficult. Accordingly, a systematic review may provide further clarity. The primary aim of this review is to determine whether thought suppression in PTSD/ASD leads to immediate enhancement or rebound effects (details of how these are defined and calculated are provided in section 2.3). The review will also examine the impact of thought suppression on any additional psychological variables measured in included studies.

2. Method

2.1 Search Strategy

An electronic search was completed using the following databases: All EBM reviews, EMBASE, CINAHL, MEDLINE, PsychINFO and PILOTS (Published International Literature on Traumatic Stress). Subject heading and text searches were completed using key terms pertaining to thought suppression: [thought suppression] or [thought suppress*] or [thought* adj4 suppress*] or [rebound effect] or [thought* control] or [mental control] or [thought rebound] or [ironic process*] or [white bear*] combined with key PTSD terms: [posttraumatic stress disorder] or [post?traumatic stress disorder] or [PTSD] or [acute stress disorder]. The additional term of [trauma*] was included in the PsychINFO

search and only thought suppression terms were used for the PILOTS search. Searches were limited to articles reported in English and published on or after 1987 (equating to research completed after Wegner's (1987) initial thought suppression studies). The title and abstract of retrieved articles were examined to determine relevance to the review, followed by a full text examination of relevant articles. The computerised search was conducted in January 2011.

Reference lists of included articles and review articles were searched. The following journals were hand searched: Behaviour Research and Therapy, Behaviour Therapy, and Journal of Traumatic Stress from 1987 to 2011. Following the search, an expert in the field was contacted (Dr Jillian Shipherd) to check for additional articles of relevance.

Inclusion Criteria

- Experimental studies on thought suppression which use a thought suppression manipulation and which employ a measure of thought frequency.
- Participants diagnosed with PTSD, ASD or participants scoring within clinical ranges according to standardised assessment measures.
- Experimental paradigms focussed on trauma related cognitions (thoughts, images, impulses and/or memories).
- Studies published on or after 1987.
- Studies reported in English.

Exclusion criteria

- Studies without an experimental manipulation of thought suppression, case studies and qualitative research.
- Unpublished dissertations.
- Papers reporting expert opinion.

2.2 Assessment of Study Quality

Included studies were evaluated using a structured assessment tool of methodological quality (Appendix II). The tool was developed based on a variety of sources including the Scottish Intercollegiate Guideline Network methodology checklists for controlled trials (2008), the Clinical Trials Assessment Measure (CTAM; Tarrier & Wykes, 2004) and the Downs & Black Checklist (1998) for the assessment of differing experimental designs. Specific methodological issues pertinent to the quality of thought suppression studies were also incorporated. Methodological quality was assessed by the author and an independent rater trained in the evaluation of clinical research. Each rater assessed the quality of papers using a score of zero to three or zero or three (whether an item was either present or absent) for each item of the scale. Inter-rater reliability was assessed by calculating the frequency of agreements between raters, for each score category (zero-three) across all items and all papers. Based on this, the Kappa statistic was calculated to provide an overall score of inter-rater reliability ($\kappa = 0.81$, $p < 0.001$), with results suggesting almost perfect agreement (Landis & Koch, 1977). Total agreement was reached for all checklist items following discussion.

2.3 Calculation of Immediate Enhancement and Rebound Effects

The calculation of enhancement and rebound effects is an issue of particular importance to this review. Traditionally, studies to date (e.g. Abramowitz et al, 2001) have calculated these effects as the difference in thought frequency between suppression and control groups (Figure 1, *C & D*). This between-subjects analysis does not consider changes in thought frequency within the thought suppression group itself and therefore does not adequately address the effects of suppression *in* the suppression group. Consequently, for the purpose of this review, it was felt more clinically relevant to examine changes in thought frequency for the suppression group alone (Figure 1, *A & B*). In addition, comparisons with control groups could be made. Accordingly, immediate enhancement is defined as a significant increase in

thoughts during thought suppression relative to baseline monitoring (Fig 1, A). A rebound effect is defined as a significant increase in thoughts during post suppression monitoring relative to baseline monitoring (Fig 1, B). For controlled studies, we would predict thought frequency in the control group to remain stable across monitoring periods. Where studies included non-clinical cohorts as comparison groups, results are reported for diagnostic groups only (participants with PTSD or ASD).

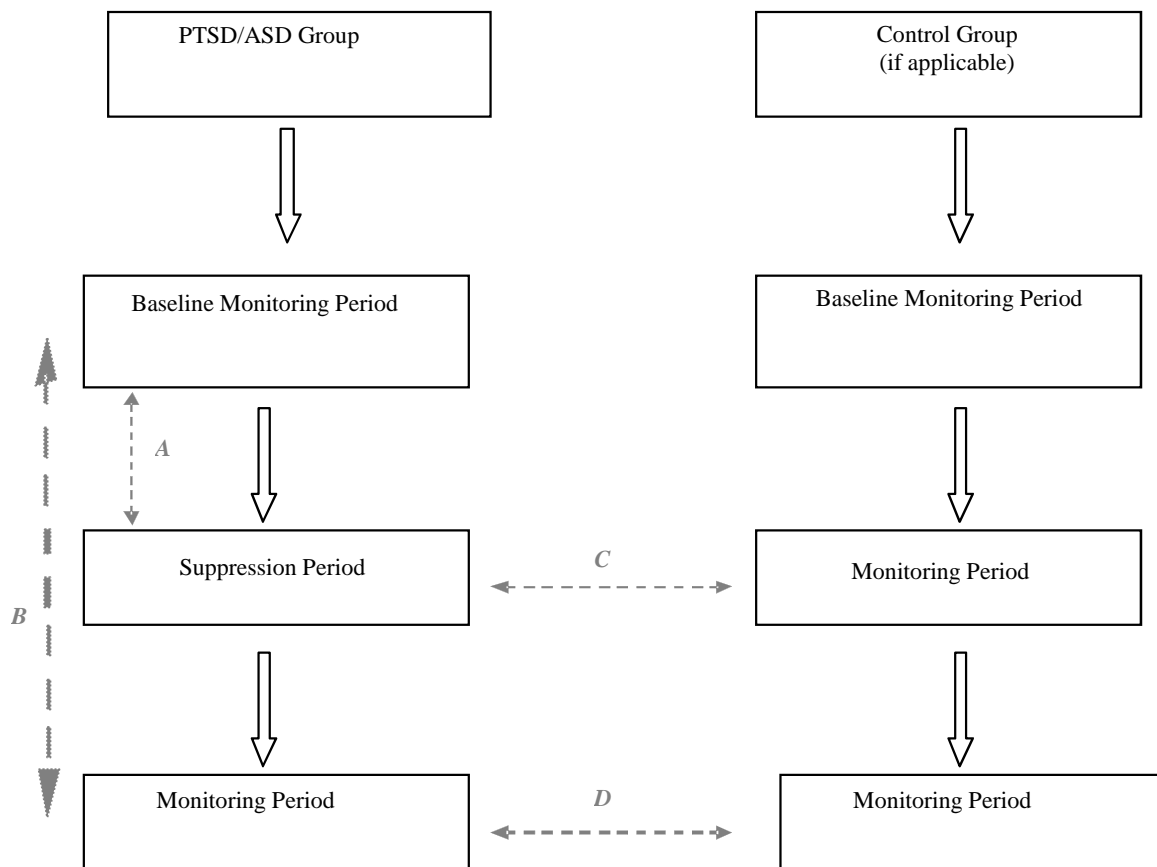


Figure 1. Calculation of Immediate Enhancement and Rebound Effects

C: Traditional immediate enhancement effect calculation (e.g. Abramowitz et al, 2001) for controlled studies: comparing thought frequency *between* groups. D: Traditional rebound effect calculation for controlled studies (e.g. Abramowitz et al, 2001): comparing thought frequency *between* groups.

2.4 Calculation of Effect Sizes

Immediate enhancement and rebound effect sizes were calculated for the PTSD/ASD suppression groups based on reported thought frequency means and standard deviations during suppression and monitoring periods. It was assumed data were normally distributed based on the use of parametric statistics in all included studies. Effect size for immediate enhancement was calculated by subtracting the suppression mean from the baseline mean and dividing by the pooled standard deviation. Effect size for the rebound effect was calculated by subtracting the post suppression monitoring mean from the baseline mean and dividing by the pooled standard deviation. This method is appropriate when the correlation between scores at two levels of a within-subjects variable is not known (Dunlap et al, 1996). Effect size magnitudes of 0.2, 0.5 and 0.8 correspond to small, medium and large effects, respectively (Cohen; 1977).

3. Results

3.1 Search Results

A total of 168 articles were retrieved from the computerised search. Of these, eight met inclusion criteria. Hand search strategies yielded one additional study for inclusion. The additional study involved an experimental manipulation of thought suppression which was embedded within an Autobiographical Memory Test. Therefore, a total of nine papers were included for review (see Figure 2 for search pathway).

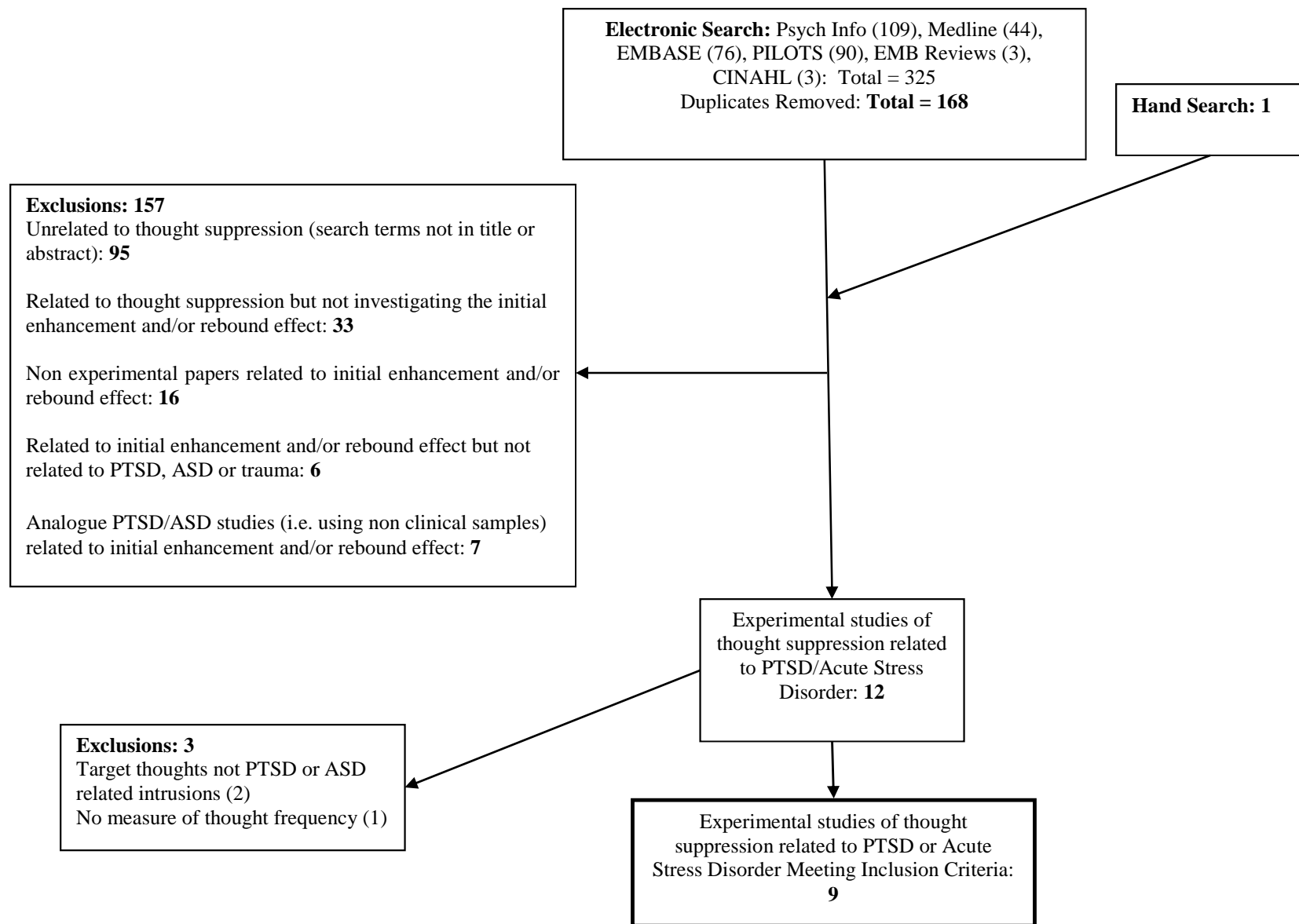


Figure 2. Search Strategy

3.2 Characteristics of Included Studies

Sample

Characteristics of participants in each study were recorded by: a) country of research, b) setting, c) total number of participants and number of participants in the PTSD/ASD thought suppression group, d) mean age, e) gender ratio, f) clinical diagnosis, g) type of trauma, and h) mean time since trauma (Table 1).

All 9 studies included participants with a diagnosis or clinically significant symptoms of PTSD (n=6) or Acute Stress Disorder (n=3), who had experienced a traumatic event since the age of 16 (specific nature of the trauma is detailed in Table 1). Seven studies formally assessed for PTSD/ASD using a structured clinical interview based on DSM-IV criteria. Two studies (Amstadter & Vernon, 2006; Rosenthal, 2007) employed standardised self-report measures corresponding to DSM-IV diagnostic criteria for PTSD/ASD. These studies were included as scores for the 'PTSD' groups both fell within clinical ranges and because the primary aim of the review was to examine control of traumatic intrusions rather than diagnosis per se.

Setting

Five studies recruited participants from clinical settings (e.g. clinics or hospitals), two studies recruited students and two studies recruited from community volunteers. Seven studies were conducted in a lab setting, one study was conducted in the natural environment over three days (Guthrie & Bryant, 2000) and one study conducted both a lab-based experiment and a naturalistic experiment over two days (Rosenthal, 2007).

Table 1

Sample characteristics of thought suppression studies in PTSD and Acute Stress Disorder

Author	Country	Recruitment	N (N of total sample)	Mean Age of Total Sample	Sex Distribution of Total Sample F:M (in Diagnostic group)	Cohort	Type of Trauma	Mean Time Elapsed in Months Since Trauma in Diagnostic Group (control group if applicable)
Amstadter & Vernon (2006)	US	Students	31 (65)	21	46:19	PTSD	Various (including sexual)	NR
Beck et al (2006)	US	Clinic Attendees	44 (70)	40	53:17	PTSD	MVA	13.9
Guthrie & Bryant (2000)	Aus	Hospital Attendees	NR* <20 (40)	32	12:28	ASD	Various (non-sexual)	< 1 month: 13.75 (5.25) days
Harvey & Bryant (1998)	Aus	Hospital Attendees	NR* <24 (48)	31	17:31	ASD	MVA	< 1 month: 7.74 (5.83) days
Nixon et al (2008)	Aus	Hospital Attendees, Victim Agencies & Police Sources	34 (56)	39	19:37	ASD	Various (non-sexual)	< 1 month: 15.86 days
Rosenthal (2007)	US	Students	32 (61)	26	61:0	PTSD	Sexual Assault	NR
Shipherd & Beck (1999)	US	Community Volunteers	17 (36)	30	36:0	PTSD	Sexual Assault	39.82
Shipherd & Beck (2005)	US	Community Volunteers	30 (55)	37	35:20	PTSD	MVA	32.23
Schönfeld et al (2007)	UK	A&E Attendees	14 (42)	33	20:22	PTSD	Physical & Sexual Assault	10.75

Table 1 Key:

N: Number of participants in PTSD/Acute Stress Disorder Suppression Group; NR = not reported; Aus = Australia; PTSD = Post Traumatic Stress Disorder; ASD = Acute Stress Disorder; MVA = Motor Vehicle Accident. *authors quoted overall sample size, but not N allocated to each group.

Design

For this review, studies have been divided into two main categories: ‘Type A’ studies controlling for suppression (n=3) and ‘Type B’ studies controlling for PTSD/ASD (n=5) (see Figure3). Type A studies included a suppression group and at least one control group of non-suppressors. Type B studies included one PTSD/ASD suppression group and a non PTSD/ASD suppression group who did not meet diagnostic criteria for PTSD/ASD. Type B studies did not include a non-suppression group. Studies which employed both type (A) and (B) controls were grouped under category (A). One study did not fit into either category (Schönfeld et al, 2007). This study counterbalanced thought suppression and monitoring phases combined with an autobiographical memory test (AMT). All studies involved personally relevant, traumatic intrusions and two studies included an additional condition using neutral thoughts (Nixon et al, 2008; Shipherd & Beck, 2005). Baseline and post-suppression recording phases were included in 8 studies.

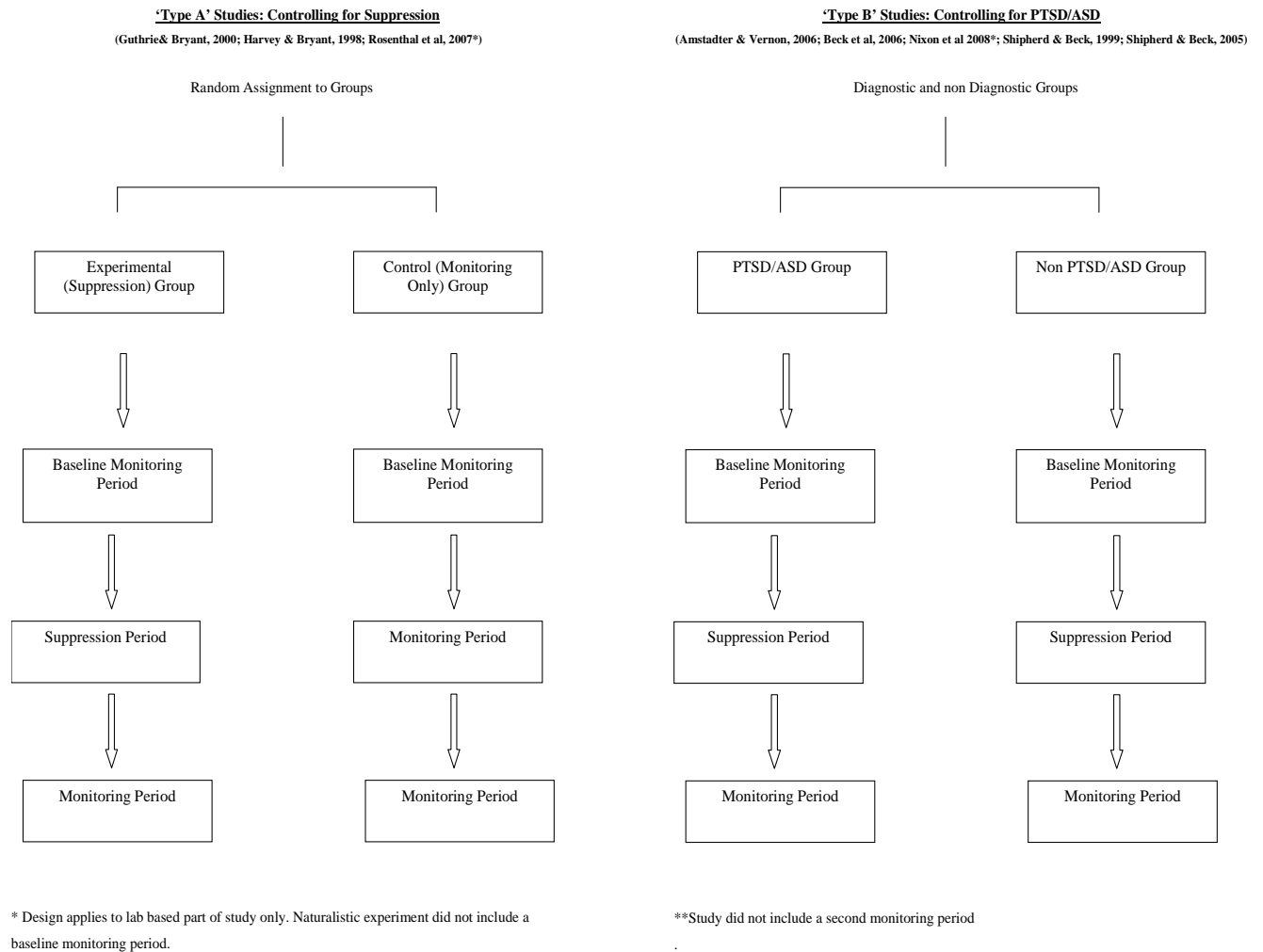


Figure 3. Experimental Designs of Included Studies

Excludes Schönfeld et al (2007) who employed a crossover design within the wider context of an Autobiographical Memory Test (AMT) test.

Independent Variables

Key independent variables were coded: a) type of control condition, b) method of thought recording, and c) length of suppression/monitoring tasks in minutes, see Table 2. Several methods were used to record target thoughts including writing, button pressing, verbal recordings and raising a hand. Diary recordings

were used in the 2 naturalistic studies. Experimental phases ranged from 5-9 minutes in lab-based studies and 24 hour blocks in the naturalistic experiments.

Experimental Conditions

Every study employed conditions of suppression and monitoring (Figure 3). Suppression instructions were comparable across studies and involved the instruction not to think about the target thought. In contrast, the type of monitoring instruction and terms used to describe it varied considerably including, ‘free monitoring’, ‘expression’, ‘think anything’ and ‘mention’. To reduce complication, in this review these terms have been simplified into 2 main categories: a) ‘mention’ and b) ‘free monitoring’ (Table 2). Mention instructions ask participants to ‘think about anything including the target thought’, whereas free monitoring instructions ask participants to ‘think about anything’, *without* making reference to the target thought. This distinction is important in the calculation of thought frequency effects as ‘free monitoring’ instructions do not control for cueing effects that occur when the suppression group is instructed to suppress (Wenzlaff & Wegner, 2000). ‘Free monitoring’ also requires an analysis of target thought occurrences by the researchers, normally reported as a percentage of target thoughts from the total number of thoughts expressed. In contrast, ‘mention’ instructions involve self-report.

Outcome Variables

All studies examined the effect of thought suppression on thought frequency and at least one other dependent variable (Table 4), including distress, mood, controllability of target intrusion (Amstadter & Vernon, 2006; Beck et al, 2006; Shipherd & Beck, 1999), trauma beliefs (Nixon et al, 2008) and thought control strategy (Guthrie & Bryant, 2000; Rosenthal, 2007).

Table 2

Study Design Characteristics and Results in Relation to the Immediate Enhancement and Rebound Effect*

Author	Setting	Design	Instructions by Group & Phase (P) (P1 = baseline monitoring, P2 = instructional phase, P3 = monitoring)	Time of Phases	Thought Recording Method	Immediate Enhancement* (ES (d))	Rebound Effect* (ES (d))
Amstadter & Vernon (2006)	Lab	B	<u>PTSD</u> : P1: free monitor, P2: SP, P3: mention <u>No PTSD</u> : P1: free monitor, P2: SP, P3: mention	5mins	Digital Verbal Recording	Y (NC)	Y (NC)
Beck et al, (2006)	Lab	B	<u>PTSD</u> : P1: free monitor, P2: SP, P3: free monitor <u>No PTSD</u> : P1: free monitor, P2: SP, P3: free monitor	9mins	Written Down	N (NC)	Y (NC)
Guthrie & Bryant (2000)	Natural	A	<u>ASD</u> : P1: mention, P2: SP, P3: mention <u>Non ASD</u> : P1: mention, P2: SP P3: mention <u>ASD</u> : P1: mention, P2: mention, P3: mention <u>Non ASD</u> : P1: mention, P2: mention, P3: mention	24hrs	Tick on Diary	N (-0.10)	N (0.10)
Harvey & Bryant (1998)	Lab	A	<u>ASD</u> : P1: mention, P2: SP, P3: mention <u>Non ASD</u> : P1: mention, P2:SP, P3: mention <u>ASD</u> : P1: mention, P2: mention, P3: mention <u>Non ASD</u> : P1: mention, P2: mention, P3: mention	5mins	Button Press	N (-0.27)	Y (0.30)
Nixon et al (2008)	Lab	B	<u>ASD</u> : P1: free monitor, P2: SP white Pear, P3: SP trauma <u>Non ASD</u> : P1 free monitor, P2: SP white Pear, P3: SP trauma	B1: 1min B2 & B3: 5mins	Raised Hand	N/A	N/A
Rosenthal (2007)	Lab / Natural	A	<u>Lab</u> : P1: mention, P2: SP, P3: mention <u>Lab</u> : P1: mention, P2: mention, P3: mention <u>Natural</u> : P1: SP, P3: mention <u>Natural</u> : P1: mention, P3: mention	3 x 9mins/ 2 x 24hrs	Written Down/ Diary Rating of Frequency	Lab: N (-0.08) Natural: N/A	Lab: N (-0.32) Natural: N/A
Shipherd & Beck (1999)	Lab	B	<u>PTSD</u> : P1: free monitor, P2: SP, P3: mention <u>No PTSD</u> : P1: free monitor, P2: SP, P3: mention	9mins	Written Down	N (-)	N (-)
Shipherd & Beck (2005)	Lab	B	<u>PTSD</u> : P1: mention, P2: SP, P3: mention <u>No PTSD</u> : P1: mention, P2: SP, P3: mention	9mins	Written Down	N (-0.28)	Y (0.19)
Schönfeld et al (2007)	Lab	CD	<u>PTSD</u> : P1: AMT, P2: mention, P3: AMT+SP, P4: MHV, P5: AMT+ mention <u>No PTSD</u> : P1: AMT, P2: mention, P3: AMT+ mention, P4: MHV, P5: AMT+SP	5mins	Button Press	N (NC)	N (NC)

Table 2 Key:

Design: Type A = parallel design with at least 1 suppression group and 1 non-suppression group, Type B = parallel design with all groups receiving suppression instructions, CD = cross over design. Instructions: SP = suppression instructions, M = mention instructions, AMT = Autobiographical Memory Test, MHV = Mill Hill Vocabulary Scale. ES = Effect Size (Cohen's *d*) only calculated in studies employing mention instructions at baseline; (-) = unable to calculate, N/A = not applicable, NC=not calculated due to methodological issues with baseline.

* Calculation based on comparison with baseline thought frequency (see criteria from section 2.3). Note that this may differ from authors *reported* effects.

3.3 Study Quality Results

Table 3 details ratings of study quality. Scores ranged from 50% - 81% (mean = 64.6%) and were categorised using a system from ‘high’ to ‘very low’ quality based on terms from the ‘Grading of Recommendations Assessment, Development and Evaluation’ system (GRADE; GRADE Working Group, 2004), see Box 1. Category assignment was based on criteria specific for the review of thought suppression paradigms (Appendix III).

Table 3
Methodological Quality Ratings of Included Studies

Author	Rating (0-100%)	Quality Category	Rebound Effect
Rosenthal (2007)	81.3%	Moderate	N
Guthrie & Bryant (2000)	72.0%	Moderate	N
Beck et al (2006)	71.2%	Moderate	Y
Harvey & Bryant (1998)	68.0%	Moderate	Y
Shipherd & Beck (2005)	66.7%	Moderate	Y
Schönfeld et al (2007)	59.6%	Low	N
Shipherd & Beck (1999)	59.0%	Low	N
Amstadter & Vernon (2006)	53.0%	Low	Y
Nixon et al (2008)	50.0%	Very Low	Not Applicable

Box 1.

Definitions of Quality Category (GRADE, 2004)

High: Further research is very unlikely to change our confidence in the estimate of effect/very low risk of confounding bias

Moderate: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate/low risk of confounding bias and a moderate probability that the relationship is causal

Low: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate/high risk of confounding bias and significant risk that the relationship is not causal.

Very low: Very high risk of bias, any estimate of effect is very uncertain.

No study obtained ‘high’ quality status defined as $\geq 85\%$. Studies fell into ‘moderate’ (65-84%; n=5), ‘low’ (51-64%; n=3), and ‘very low’ ($\leq 50\%$; n=1) quality categories, giving an indication of their sufficiency to address the primary question set out in this review – whether suppression of traumatic intrusions leads to immediate enhancement or rebound effects.

3.4 Impact of Thought Suppression on Thought Frequency

The effect of thought suppression on thought frequency was coded according to whether results demonstrated an immediate enhancement and/or rebound effect. In one study (Nixon et al, 2008), it was not possible to calculate an immediate enhancement or rebound effect because there was no thought frequency data for the baseline monitoring phase. Therefore, 8 studies were examined for immediate enhancement and rebound effects.

Immediate Enhancement

Amstadter & Vernon’s (2006) lab-based study recruited students with PTSD and a comparison group without PTSD. Trauma related intrusions were recorded across 3 consecutive 5 minute phases: ‘baseline free monitoring’, ‘suppression’ and ‘mention’. Thoughts were vocalised into a digital recorder which was analysed for intrusive thought frequency. Results demonstrated a significant increase in trauma target thoughts during suppression compared to baseline in both groups. The authors reported this as an immediate enhancement effect, but did not make reference to the fact that participants were asked to read out a description of their trauma *immediately* prior to the suppression phase. This is likely to have primed the occurrence of target thoughts during suppression. Indeed, this seems probable given that mean thought frequency at baseline was 0.64 and during suppression it was 4.72.

It has been argued that immediate enhancement is particularly prevalent when concurrent demands are placed on working memory, often known as mental load. When suppressing under conditions of mental

load, the accessibility of the target intrusion is thought to increase (Wegner & Erber, 1992). Schönfeld's (2007) study of assault related intrusions incorporated a mental load by using an Autobiographical Memory Test (AMT, Williams & Broadbent, 1986). The AMT test required participants to read out 12 words (6 positive and 6 negative) and recall a specific memory in response to each word. A standard AMT test was followed by two further AMTs conducted under thought suppression and mention conditions in counterbalanced order. It was not possible to calculate an immediate enhancement effect due to the design of the experiment, but thought frequencies were lowest during the suppression AMT test compared to standard and mention AMTs. This is inconsistent with claims that a concurrent mental loading task can lead to enhancement during suppression.

No other study found evidence for an immediate enhancement effect. In fact, a reduction in thought frequency during suppression compared to baseline was found across studies (Beck et al, 2006; Guthrie & Bryant, 2000; Harvey and Bryant, 1998; Rosenthal, 2007; Shipherd & Beck, 2005; Shipherd and Beck, 1999; Schönfeld, 2007). It is possible that studies which assessed for PTSD/ASD immediately prior to the experimental phases (Shipherd & Beck, 1999; Harvey & Bryant, 1998; Guthrie & Bryant, 2000; Schönfeld et al, 2007) may have precluded detection of effects by inflating thought frequency at baseline.

Rebound Effect

'Type A' Studies

Four studies employed a parallel design (see Figure 3) with a non-suppression control condition (Guthrie & Bryant, 2000; Harvey & Bryant, 1998; Rosenthal, 2007). Schönfeld's (2007) study is included because the thought suppression manipulation was counterbalanced with a mention condition, thus providing a pseudo-control comparison. Out of these controlled studies, only one reported a rebound effect (Harvey & Bryant, 1998), as illustrated in Figure 4.

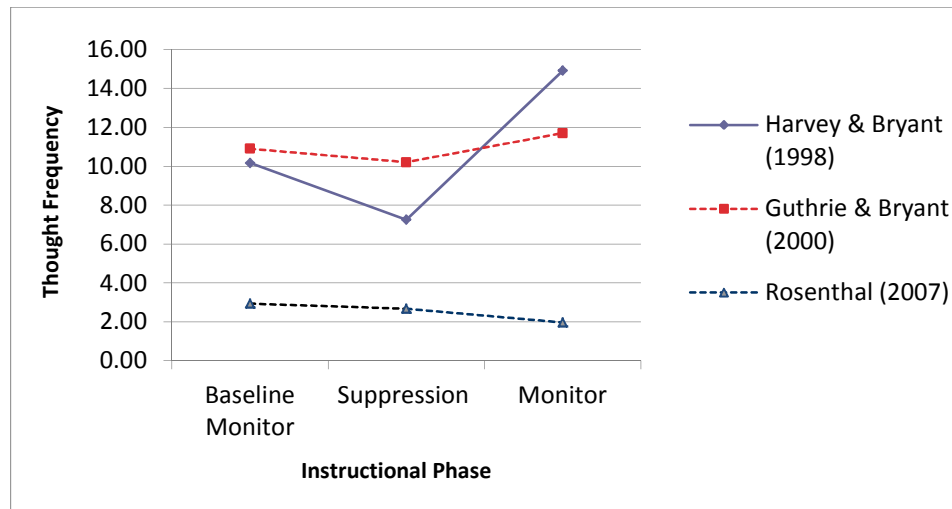


Figure 4. Mean Thought Frequency Data for the Suppression Group in ‘Type A’ Studies

Harvey and Bryant’s (1998) study examined the effects of suppression on MVA-related intrusions in a small cohort of ASD and non-ASD participants. Those instructed to suppress reported more trauma-related thoughts in the follow-up monitoring period compared to baseline and to the non-suppression control group, thus demonstrating a rebound effect. This effect was reported across ASD and non ASD diagnostic groups. However, examination of their data suggests that a rebound effect only actually manifested in the ASD group and that the magnitude of the effect was small (ES: 0.30).

As a replication and extension of Harvey and Bryant’s (1998) study, Guthrie and Bryant (2000) recruited an ASD cohort to examine the effects of suppression in the natural environment across three 24 hour experimental blocks, again with small samples. Results indicated no effect for suppression in relation to thought frequency, although ratings of suppression effort were high across all experimental phases. Accordingly, participants may have suppressed regardless of instructions, thereby preventing detection of a rebound effect.

Rosenthal (2007) conducted both a lab-based and a naturalistic experiment using a female sample who had experienced sexual assault. Participants did not have a formal diagnosis of PTSD, but scored within the ‘moderate’ range on the Post Traumatic Diagnostic Scale (PDS; Foa et al, 1997). The lab-based study employed three consecutive nine-minute phases where participants completed ‘mention’, ‘suppression’ and ‘mention’ conditions respectively. Thoughts were recorded by two methods, a written stream of thoughts and marking an x when the target intrusion occurred. The written stream of thoughts was analysed for the percentage of target thoughts and frequency of xs. No rebound effect was demonstrated with either of these methods. In the second phase of Rosenthal’s (2007) study, participants from both the suppression and control groups were randomly allocated to suppress or monitor in the natural environment over two 24-hour blocks. Participants in the first block received either suppression or mention instructions, followed by both groups receiving mention instructions in the second block. The authors reported a non-significant increase in target thoughts across days for the suppression group and a non-significant decrease in target thoughts across days for the monitoring group. This was interpreted as modest evidence for a rebound effect, yet the mean increase in thoughts was negligible (<1) and is hard to interpret given that there was no baseline phase for comparison.

Schönfeld et al’s (2007) study aimed to investigate the relationship between suppression and over general memory in survivors of physical and sexual assault with and without PTSD. As mentioned, this study incorporated a thought suppression manipulation within an AMT and used five experimental blocks lasting five minutes. All participants completed a baseline AMT and two further AMTs under thought suppression instructions and mention instructions in counterbalanced order. Thought frequency was examined in five -minute monitoring periods before and after the first experimental AMT condition. No rebound was demonstrated. However, fewer thoughts were reported after the mention AMT condition in comparison to the thought suppression AMT condition. The authors claimed that this was indirect evidence for the rebound effect, in that suppression prevented the natural decline in trauma-related thoughts seen in the mention group.

'Type B' Studies

Four studies recruited a comparison thought suppression group of participants who had experienced a traumatic event, but who did not meet criteria for PTSD or ASD (Figure 3; Amstadter & Vernon, 2006; Beck et al, 2006; Shipherd & Beck, 1999; Shipherd & Beck, 2005). All four studies *reported* a rebound effect. However, three of these studies (Amstadter & Vernon, 2006; Beck et al, 2006; Shipherd & Beck, 1999) were seriously confounded by employing 'free monitoring' instructions at baseline which instruct participants to 'think anything' without making reference to the target thought. As mentioned previously, 'priming' of the target thought can ensue once participants are instructed to suppress (Figure 5 demonstrates an example of this). This renders comparisons with baseline meaningless. The lack of a non-suppression control group in these studies compounds this issue by preventing analysis of whether effects are due to suppression itself or are an artefact of the number of times the target thought is mentioned across instructional phases.

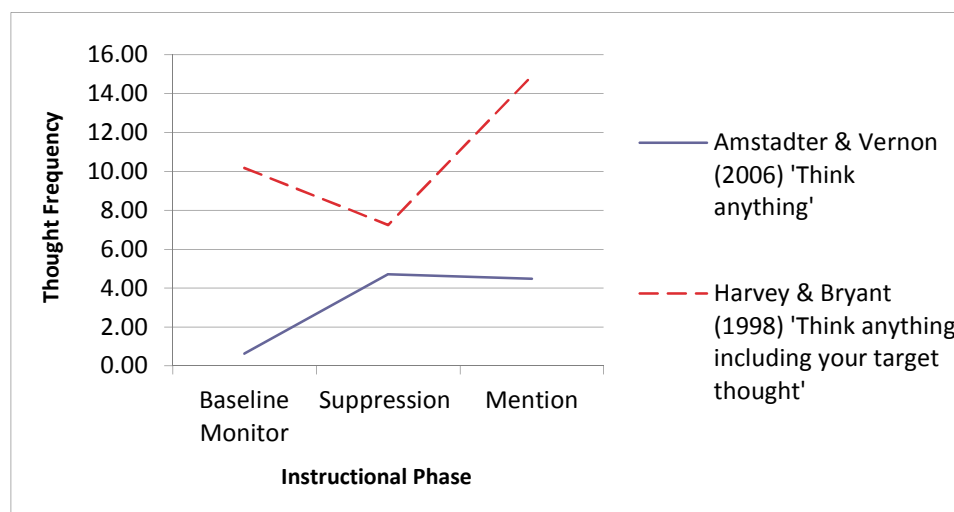


Figure 5. Baseline Monitoring Methods

Comparing thought frequency data from one study employing a 'free monitoring' baseline phase (Amstadter and Vernon, 2006) another study employing a 'mention' baseline phase (Harvey and Bryant, 1998).

In summary of these three studies, Amstadter & Vernon (2006) found target thought frequency to be higher post suppression compared to baseline, yet thought frequency rates were similar during suppression and post suppression phases, suggesting that thought frequency failed to subside post

suppression. Beck et al's (2006) study of MVA intrusions found that both PTSD and non PTSD groups were successful in suppressing intrusions yet reported more thoughts during their post suppression monitoring phase compared to baseline. However, it was possible that participants continued to suppress into the post suppression phase (Beck et al, 2006). Nevertheless, the rebound effect in both groups was thought to be because the cohort was help seeking in relation to trauma symptoms. Finally, Shipherd & Beck (1999) found a significant increase in thoughts post suppression for the PTSD group, but not for the non PTSD group. This was viewed as a rebound effect, although thought frequency post suppression did not increase beyond baseline levels.

Shipherd & Beck's (2005) study aimed to extend their previous research findings (Shipherd & Beck, 1999) by examining other types of trauma in PTSD, specifically MVA intrusions. The effects of suppression on personally relevant neutral intrusions were also examined. In contrast to the other three Type B studies, this experiment utilised mention instructions at baseline. Consistent with their predictions, a rebound effect was demonstrated for trauma intrusions in the PTSD group only. No rebound effect was found for neutral target thoughts in the PTSD group. In summary, although all four Type B studies reported a rebound effect, only Shipherd and Beck (2005) provide robust evidence.

Considering both Type A and B designs and according to criteria of this review, a rebound effect was demonstrated in a total of five studies. However, taking methodological issues into account, only two studies demonstrate clear evidence of an effect (Harvey & Bryant, 1998; Shipherd & Beck, 2005).

Effect Sizes

Effects sizes (ES) were only calculated in studies which used a mention condition at baseline (n=6). It was not possible to calculate ES in studies which did not report means and standard deviations for each experimental block (Shipherd & Beck, 1999; Schönfeld et al, 2007). Therefore ESs were calculated in 4 studies. Positive values reflect that an effect has occurred (i.e. increased thought frequency) and negative

values indicate an opposite effect (i.e. reduced thought frequency). For immediate enhancement, ES ranged from -0.08 to -0.28 and for the rebound effect they ranged from -0.32 to 0.30 (Table 2).

3.4 Findings Beyond Thought Frequency

All studies employed additional measures to examine wider impacts of thought suppression on variables such as distress, mood, cognitive appraisal and thought control strategies (Table 4).

Distress and Mood

Most studies employed a subjective measure of upset caused by intrusions during experimental phases. Four studies employed a 'subjective unit of distress scale' (SUDS). Contrary to expectations, a significant change in self-reported distress was generally not found across experimental phases (Amstadter & Vernon, 2006; Rosenthal, 2007; Shipherd & Beck, 2005). Indeed, distress was actually found to decrease during suppression compared to baseline monitoring (Shipherd and Beck, 1999; Schönfeld et al, 2007). These studies both assessed PTSD/ASD immediately prior to the experiment, potentially inflating anxiety levels at baseline. In the period following suppression, Beck et al (2006) found a significant increase in SUD and anxiety. A non-significant increase in distress was also found after suppression in Rosenthal's (2007) naturalistic study. For ASD samples, no significant changes in anxiety were reported in suppression group over time or in comparison to the non-suppression control group (Guthrie & Bryant, 2000; Harvey & Bryant, 1998).

Table 4
Additional Outcome Variables in Relation to Thought Suppression*

Author	Additional Measures	Significant Effect (p<0.05)	Details of Effects
			(P1 = baseline monitoring phase, P2 = instructional phase, P3 = monitoring phase)
Amstadter & Vernon (2006)	1. SUDs 0-100	N	1. -
	2. PANAS	N	2. -
	3. Controllability	Y	3. Thought frequency related to difficulty controlling thoughts in P2 & P3 (rs=.49, .32).
Beck et al. (2006)	1. SUDS 0-100	Y	1. Increase in distress in P3 vs. P1.
	2. Anxiety 0-100	Y	2. Increase in anxiety in P3 vs. P1.
	3. PANAS	N	3. -
	4. Controllability	Y	4. Difficulty controlling thoughts increased significantly in P2 & P3 vs. P1.
	5. Suppression Success	Y	5. Significantly lower ratings in PTSD group vs. non PTSD group during P2.
Guthrie & Bryant (2000)	1. Anxiety 0-100	N	1. Statistics not reported, although, anxiety did not increase beyond P1 levels and anxiety at P1 & P3 were the same.
	2. TCQ	Y	2. Suppression group used more distraction and worry. ASD suppressors used social control less than non ASD suppressors.
Harvey & Bryant (1998)	1. Anxiety 0-100	N	1. Main effect for anxiety in suppression group but no univariate F test reached significance.
Nixon et al. (2008)	1. Trauma Beliefs	N	1. PTCI & PTCI 6 correlated with intrusion frequency during suppression (r = .32, .23 respectively, p<0.10).
Rosenthal* et al. (2007)	1. Natural: SUDs 0-10	N	1. NS trend towards increased distress in P2 vs. P1 for those who suppressed on P1.
	2. Lab: SUDs 0-10	N	2. Significant group x time interaction but NS change across phases within group. Monitor group more distressed than SP across P2 & P3
	3. Lab: TCQ	N	3. During suppression, SP group had NS trend towards increased use of cognitive reappraisal compared to mention group (p=0.07).
Shipherd & Beck (1999)	1. SUDs 0-100	Y	1. Distress decreased during P2 (SP) versus P1.
	2. MAACL	Y	2. Significantly more depression rated in P1 vs P2 & P3.
	3. Controllability	Y	3. Difficulty controlling thoughts higher in P2 (SP) versus P3 (mention).
Shipherd & Beck (2005)	1. SUDs 0-100	N	1. -
	2. MAACL	Y	2. Anxiety higher in P1 vs P2 (SP) & P3.
Schönfeld et al. (2007)	1. Anxiety 0-100	Y	1. Greater anxiety during Standard AMT vs Suppression AMT.
	2. Despondent 0-100	Y	2. Greater despondency during Standard AMT compared to Suppression and Mention AMT.
	3. Happy 0 -100	N	3. -
	4. AMT	N	4. Trend for more omissions in Suppression vs. Mention AMT condition (p=0.059).

Table 4 Key:

PANAS = Positive & Negative Affective Schedule-Expanded Form (Watson & Clark, 1991); MAACL = Multiple Affective Adjective Check List –Revised (Zuckerman & Lubin, 1985); TCQ = Thought Control Questionnaire (Wells & Davies, 1994); SUDS = Subjective Units of Distress; PTCI: Post Traumatic Cognitions Inventory (Foa et al., 1999); NS= non-significant.

* Results reported relate to PTSD or ASD clinical groups only. The table summarises *within group phase effects* and also *between group effects if the study is a controlled trial*. Only significant results are reported in detail.

Studies employing measures of mood such as the Positive & Negative Affective Schedule-Expanded Form (PANAS; Watson & Clark, 1991) and the Multiple Affective Adjective Check List –Revised (MAACL; Zuckerman & Lubin, 1985) failed to find any detrimental effects associated with suppression. No significant findings emerged for the PANAS across phases (Amstadter & Vernon, 2006; Beck et al, 2006). Studies which employed the MAACL found higher levels of depression (Shipherd & Beck, 1999) and higher levels of anxiety (Shipherd & Beck, 2005) during baseline compared to suppression and post suppression phases.

Overall there is no clear evidence for a detrimental effect of suppression on distress, anxiety or mood both during the act of suppression or in the period following it.

Cognitive Appraisal

Three studies examined appraisals of thought controllability. Beck et al (2006) found difficulty in controlling thoughts increased during suppression and remained high post suppression. Shipherd & Beck (1999) also reported greater difficulty controlling thoughts during suppression compared to post suppression. However, controllability at baseline was not measured. A correlational relationship was also found between thought frequency and difficulty in controlling thoughts during and after suppression ($r=0.49, 0.32$ respectively; $p<0.01$; Amstadter & Vernon, 2006). Nixon et al (2008) was the only other study to examine thought appraisals in relation to thought suppression ability in ASD and non ASD groups. Non-significant correlational trends were found between negative trauma beliefs on the Post Traumatic Cognitions Inventory (PTCI; Foa et al, 1999) and intrusion frequency during suppression, although the study lacked power.

In summary, the research into thought appraisals is limited and sheds little light on how suppression may maintain maladaptive thought appraisals, as posited by cognitive models (e.g. Ehlers and Clark, 2000).

Thought Control Strategies

Two studies examined thought control strategies using the Thought Control Questionnaire (TCQ; Wells & Davies, 1994) which groups strategies into 5 scales: distraction, reappraisal, social control, worry and self-punishment. Guthrie & Bryant (2000) administered the TCQ post experiment, although it was unclear whether participants completed it based on their retrospective evaluation of the entire experiment or a specific period e.g. suppression. The suppression group used significantly more distraction and worry to control their intrusions compared to the mention group. The ASD suppression group was also found to use less social control than the non-ASD suppression group. It was unclear from the data whether there were baseline differences in TCQ scores between the groups. Rosenthal et al (2007) employed the TCQ for their lab-based experiment at baseline and after the suppression phase with no significant findings. Overall, these results clearly demonstrate a lack of research in this area.

4. Discussion

4.1. The impact of thought suppression on thought frequency

The primary aim of this review was to examine immediate enhancement and rebound effects in PTSD/ASD. Only one study (Amstadter & Vernon, 2006) reported evidence for an immediate enhancement effect, yet methodological issues render this result questionable. In the remaining seven studies, thought frequency actually declined during suppression (ES: -0.08 to -0.28). The consistent lack of evidence for an immediate enhancement effect across studies suggests that attempted suppression of traumatic intrusions does not lead to an immediate surge in thought frequency. In fact, it could be argued that individuals with PTSD and ASD are able to suppress their traumatic intrusions successfully in the short term. This is consistent with more general findings on immediate enhancement. For instance, Abramowitz's (2001) meta-analytic review of all controlled thought suppression studies found an overall negative effect size for the immediate enhancement effect (-0.35). It is possible that immediate enhancement findings are a result of social desirability, which

may reduce willingness to report intrusions during suppression. This factor was not assessed in the current studies.

In terms of the purported rebound effect, findings were more mixed. Four out of eight studies demonstrated a rebound effect, yet only one of these was a controlled study (Harvey & Bryant, 1998; ES: 0.30). The remaining studies had significant methodological confounds, either through inadequate baseline monitoring methods or lack of a non-suppression control group (see section 4.3 for discussion). Interestingly, both naturalistic studies failed to demonstrate a rebound effect, which may have important implications for how thought suppression impacts on intrusions in daily life. It may be that individuals are able to suppress in the short-term but over longer monitoring periods, such as one week, suppression may fail (e.g. Geraerts et al, 2006). On the other hand, participants may be more able to utilise adaptive coping strategies towards intrusions (e.g. distraction, social control or cognitive reappraisal) in their day-to-day environment, thereby leading to reduced thought occurrences.

An alternative suggestion has been that thought suppression may impact on the habituation of intrusions, rather than causing a rebound effect (Purdon & Clark, 2001). This possibility is consistent with the idea that maladaptive mental control strategies prevent the subsidence of trauma symptoms (Wells, 2000) and findings from thought suppression paradigms in other domains, such as obsessional intrusions (e.g. Marks & Wood, 2005). No studies in this review demonstrated such an effect.

4.2. The wider impact of thought suppression

Clinically, it may not be the mere presence of intrusive thoughts that is problematic. Suppression may have a wider role by maintaining maladaptive interpretations of intrusions and distress. Accordingly, there has been some investigation into the broader impacts of suppression, results of which have been mixed and complicated by the variety of measures employed.

‘Distress’ has been most widely measured, with little evidence of detrimental effects. Only one study demonstrated an increase in distress and anxiety post suppression (Beck et al, 2006). This study recruited a sample help-seeking in relation to symptoms of PTSD/ASD which is likely to be an important predictor of distress in relation to intrusions. Beyond distress, there is a lack of research into the impact of suppression on other variables. The measurement of appraisals has been extremely limited with only perceived ‘controllability’ being measured experimentally and in only three studies. This seems at odds with dominant models of trauma which view thought appraisals to be central in the development and maintenance of PTSD (e.g. Ehlers & Clark, 2000). Two studies examined mental control strategies used by participants, stemming from the idea that thought suppression may refer to a range of different processes. Only one study found significant results (Guthrie & Bryant, 2000). As it is possible that proficiency in thought control strategies attenuates thought occurrences (Kelly & Kahn, 1994), further research is needed to examine specific adaptive and maladaptive strategies in relation to traumatic intrusions.

4.3 Limitations of research papers

The methodological quality of studies ranged from ‘moderate’ to ‘very low’ in quality (Table 3). No study reached ‘high’ quality criteria indicating methodological weaknesses in the current literature and a need for further research to increase confidence in findings. Key methodological limitations involved a lack of controlled studies, small sample sizes, a lack of research in help-seeking clinical cohorts and poor thought recording methods and instructions. Many of these issues have been highlighted previously (Abramowitz, 2001; Purdon, 1999). Controlled studies are of particular importance because suppression instructions in themselves may cue target intrusions leading to an inflation in thought frequency (Wenzlaff & Wegner, 2000). Several studies may have lacked power given that no power calculations were reported. In six studies the sample size was less than 27 per group (range: 14-44, mean = 26) which is deemed problematic based on guidance from CTAM (Tarrier & Wykes, 2004). The quality of the current research and the cohorts recruited also impedes generalisation of findings to practice.

Given inconsistent findings throughout this review, it is important for future studies to recruit treatment seeking cohorts. In addition, most papers did not formally assess for co-morbid psychological diagnoses such as depression or anxiety disorders. Therefore, it is impossible to establish how these difficulties impact upon the ability to suppress. The research is also lacking in ecological validity. Seven studies were lab-based with experimental manipulations ranging from 5-9 minutes in length. Methodological issues were also apparent with baseline monitoring methods. Several studies assessed for PTSD/ASD immediately prior to the experimental phases (Shipherd & Beck, 1999; Harvey & Bryant, 1998; Guthrie & Bryant, 2000; Schönfeld et al, 2007), potentially inflating symptomatology at baseline. This is problematic when making comparisons to baseline, as was done in this review. A second issue relates to the use of 'free monitoring' instructions at baseline. As discussed at the start of this review, this method may prime target thought occurrence upon the instruction to suppress. In addition, five studies did not employ a measure of suppression effort or compliance with experimental instructions.

4.4 Limitations of Review

The review combined studies of both ASD and PTSD cohorts and accordingly, time since the trauma differed hugely (ASD: 7.74 days – 15.86 days, PTSD: 13.9 months – 39.82 months). It is probable that these cohorts differed in terms of symptom severity, co-morbidity, vividness of intrusions and thought control methods. This makes overall comparisons between studies difficult. Moreover, caution is required when extrapolating findings to clinical practice.

The inclusion criteria employed limited the scope of the review due to the exclusion of alternative experimental designs (e.g. correlational studies) and potentially relevant samples (e.g. analogue cohorts). The methodological quality tool was based on a variety of sources and is idiosyncratic to thought suppression research. Despite good inter-rater reliability ($\kappa=0.81$) the validity of the tool was untested and hence quality scores are provided as an approximate guide.

Finally, the very construct of ‘traumatic intrusion’ is a source of debate and can refer to a range of cognitive phenomena from sensory flashes to traumatic rumination. A strict definition was not employed for this review due to the small number of papers available and because details of intrusions were not specified in any of the papers included. It is possible that some types of intrusions may be more easily suppressed than others. Therefore, it would be helpful for future research to report details of trauma targets, particularly differentiating between traumatic memories and non-memory based ruminations which are thought to be separate constructs (Ehlers and Clark, 2000). It may also be of benefit to consider effects of suppression on specific intrusive phenomena.

4.5 Clinical and Research Implications

Dominant models of PTSD (e.g. Ehlers & Clark, 2000) propose that thought suppression maintains trauma symptomatology by: (a) directly generating intrusions, (b) preventing changes in negative appraisals about the trauma, and (c) preventing changes in the nature of the trauma memory. The present review indicates that the extant empirical literature provides very little evidence for mechanism (a). It is also unclear whether relinquishing suppression is associated with treatment success (Rassin, 2000). Further to this, strategies opposite to suppression, such as unstructured exposure to traumatic internal experiences, may even enhance distress (Littrel, 1998). As suggested by Rassin (2000), we may need to have a more balanced view on thought suppression, particularly in terms of its causal role. Adjusting this view may have important treatment implications since cognitive and meta-cognitive approaches advocate the use of thought suppression experiments with patients and the ‘banning’ of thought suppression (e.g. Wells, 2000; Ehlers & Clark, 2000). Based on results from this review, perhaps our efforts should be focussed elsewhere. It would be interesting to determine whether evidence supports a role for thought suppression via mechanisms (b) and (c) as this may reveal a detrimental impact of suppression in the longer-term. It is recommended that further thought suppression paradigms employ measures of thought appraisals in order to shed light on this issue.

It may also be timely for research to move beyond ‘thought suppression’. The rationale for this is two-fold. First, the empirical evidence for its role is weak at best and second, the instruction to ‘thought suppress’ may result in a range of mental processes (Smari, 2001). As most studies have not captured individual differences in mental control strategies used during suppression, this is an important target for future research. Alternatively, experimental manipulations of *specific* approach and avoidant strategies may be more elucidating. This would help to distinguish between strategies that may overlap with suppression, such as distraction. Research is also beginning to consider acceptance-based manipulations, with preliminary findings showing reduced distress associated with obsessional intrusions when compared to suppression (e.g. Najmi, Riemann & Wegner, 2009). This work has yet to be extended to traumatic intrusions and is an obvious avenue for further investigation.

The studies in this review are limited in terms of their clinical relevance and more research is required in clinical cohorts. Naturalistic designs in participants every-day environment, over longer time periods, would increase ecological validity and generalisability to practice. The methodological quality of studies could be improved upon by: 1) always employing a non suppression control group, 2) basing sample size on power calculations, 3) assessing PTSD/ASD symptoms in a separate session from the experiment, 4) assessing for co-morbidity, 5) not using free monitoring instructions at baseline, 6) routinely measuring suppression effort (i.e. compliance with experimental instruction), and 7) capturing thought control strategy. In addition, it has been argued that measures of thought frequency are confounded by thought duration (Purdon, 2004). For example, a thought that lasts one second would be recorded in the same way as a thought lasting one hour. In light of this, it has been recommended that studies also employ a measure of thought ‘dismissability’ (Purdon, 2004), meaning the ease at which thoughts can be removed from mind.

5. Conclusions

On the basis of current evidence, the act of thought suppression does not lead to an immediate enhancement effect, but rather reduces thought frequency. After suppression, there is inconsistent evidence that there is a later surge in thoughts known as the rebound effect. Overall, this provides little support for the causal role of suppression in PTSD/ASD. Further controlled studies which improve upon the methodological limitations noted in this review may be warranted. Nonetheless, given the difficulties in accurately conceptualising the process of 'suppression', it is suggested that research moves beyond this to focus on more specific avoidant and approach-based strategies. In addition, much of the research is lacking in terms of its investigation of wider variables such as appraisals and distress. Research in this area is essential to further our understanding of the processes cited in dominant models of trauma to date (e.g. Clark & Ehlers, 2000). Clinically, we must remain aware that thought suppression may not be detrimental to all and may, in fact, have beneficial effects, in the short term (Bakker, 2009). Given that utilising a range of coping strategies is associated with higher levels of psychological wellbeing (Aldwin & Revenson, 1987), perhaps thought suppression may be a viable method within a repertoire of techniques. Unfortunately, due to numerous cognitive theories incorporating thought suppression as a maintenance factor in psychopathology, this possibility appears to have been overlooked, in spite of the weak empirical evidence to date.

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CHAPTER 2: MAJOR RESEARCH PROJECT

The Impact of Thought Suppression Outside the Laboratory: Effects on Thought Frequency, Dismissability and Distress in an Obsessional Cohort

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Declaration of conflicts of interest: None

Prepared in accordance with submission requirements for Behaviour Research and Therapy (*See Appendix I*).

Plain Language Summary

Aims of Study

The aim of this study was to find out what happens when people try to suppress their thoughts. This means asking people not to think about something, for example, 'do not think about a white bear'. This study was interested in the suppression of a specific type of thought experienced in Obsessive Compulsive Disorder (OCD) called an 'intrusive thought'. Some research has found that asking people to suppress their thoughts can cause even more thoughts to occur, but further experiments are needed to prove this.

What the Study Involved

Fifty two students experiencing intrusive thoughts took part. Participants were randomly split into two groups: a) suppression, and b) monitor only. For each day, over the course of the week, participants kept a record of how often they experienced their intrusive thoughts and gave some ratings about them. On days three and four, the suppression group were told to try as hard as possible not to think about their chosen thought.

Results

The suppression group reported fewer thoughts during and after suppression and less anxiety compared to the monitor only group. During suppression, participants used more distraction strategies to control their thoughts compared to the monitor only group.

Conclusions

The results suggest that suppression may cause a *lower* number of thoughts to occur. This goes against theories which state that thought suppression causes *more* thoughts to occur. There was also no evidence that suppression had any other negative effects on participants. These results suggest that thought suppression might be helpful for people in the short-term. These findings may help to improve psychological theories of OCD and treatments for intrusive thoughts.

Abstract

Background: Thought suppression is a form of mental control implicated in the development and maintenance of Obsessive Compulsive Disorder (OCD).

Aims: To examine the impact of thought suppression on intrusive thought frequency, distress and thought dismissability in a non-clinical, high obsessional cohort.

Method: Fifty two non-clinical participants, screened for obsessional intrusions, completed a thought suppression paradigm over one week. Participants were randomly allocated to a suppression (N=25) or mention (N=27) group and completed three experimental phases, each lasting two days: (1) baseline monitoring, (2) experimental instruction (suppress or mention), and (3) monitoring. Participants recorded target thought occurrences and daily ratings of thought frequency, duration, dismissability, anxiety and unacceptability.

Results: The suppression group experienced reduced thought frequency during phases two and three relative to baseline. Lower levels of anxiety were reported in the suppression group relative to the mention group at phases two and three. Suppression instructions had no impact on ratings of dismissability or unacceptability of intrusive thoughts.

Conclusions: Results do not support the view that thought suppression leads to an immediate or delayed increase in thought frequency. There was no evidence that thought suppression led to any other detrimental effects. Theoretical and clinical implications are considered.

Keywords: Thought Suppression; Obsessive Compulsive Disorder; Intrusive Thoughts.

Highlights

- Suppression of OC intrusions was examined in a non-clinical cohort.
- Thought suppression did not lead to an initial enhancement or rebound effect.
- Thought suppression had no impact on the dismissability of intrusions.
- Distraction may be an effective strategy when used under suppression conditions.
- This study questions the causal role of suppression in the maintenance of OCD.

Introduction

Thought Suppression

Thought suppression is viewed as a form of mental control that individuals may use to manage unwanted thoughts and emotions and refers to the ability not to think about certain thoughts or events. Empirical testing of this phenomenon began with Wegner et al's (1987) classic 'white bear' studies. Participants were randomly assigned to two groups, each completing two five minute conditions in counterbalanced order: 1) to try not to think about a white bear (suppression), and 2) to try to think about a white bear (expression). Two main effects were demonstrated. First, during suppression, both groups experienced thought occurrences and therefore were unable to suppress white bear thoughts fully. Second, in the group who completed the suppression condition first, a surge in thought occurrences was experienced during the expression period. This was coined the 'rebound effect', meaning an increase in thought frequency *following* a period of suppression. Further research also demonstrated an increase in thought frequency *during* the act of suppression (e.g. Lavy & van den Hout, 1990), now known as the 'immediate enhancement effect'.

These paradoxical effects have been assumed to have relevance in the maintenance of various psychological disorders including Obsessive Compulsive Disorder (OCD) (Wenzlaff & Wegner, 2000). OCD is characterised by the presence of recurrent obsessional thoughts, images or impulses (DSM-IV; APA, 2000) which are defined as intrusive, uncontrollable, distressing, ego-dystonic and actively resisted (Clark, 2004). The resistance of intrusions has obvious relevance to thought suppression. Indeed, cognitive models of OCD incorporate thought suppression as a maintenance factor (Salkovskis, 1985; Rachman, 1997, 1998; Wells & Matthew, 1994) in two main ways. First, suppression is believed to terminate exposure to intrusions, thereby preventing disconfirmation of catastrophic beliefs and maladaptive appraisals of intrusive thoughts. Second, based on Wegner's research (1987), suppression is viewed to paradoxically increase intrusion frequency. Purdon & Clark (1999) have expanded on these conceptualisations by suggesting that thought control techniques,

including suppression, directly contribute to distress by escalating preoccupation with intrusions and exacerbating maladaptive beliefs about the importance of thought control.

Evidence for the Immediate Enhancement and Rebound Effects in OCD

Given the potential relevance of thought suppression to OCD, several studies have attempted to replicate immediate enhancement and rebound effects with obsessional intrusions. This research has largely failed to find evidence for these effects with only two controlled studies supporting an immediate enhancement effect (Trinder and Salkovskis, 1994; Salkovskis and Campbell, 1994). A meta-analysis of controlled thought suppression studies, including both neutral and clinically relevant thoughts (Abramowitz, Tolin, & Street, 2001), found a small negative effect size (-0.35) for immediate enhancement, indicating that suppression may, in fact, reduce thought frequency and be successful in the short-term.

The rebound effect in OCD has not been verified in controlled thought suppression studies either (e.g. Belloch et al, 2004; Purdon, 2001). A systematic review of 11 controlled studies in OCD (McLean & Broomfield, 2006) found negative effect sizes for the rebound effect, again suggesting that thought suppression led to reduced thought frequency. In addition, Abramowitz et al's (2001) meta-analysis of the overall literature found a relatively weak effect size (0.35) for the rebound effect. In summary, there appears to be fairly little evidence to support the idea that suppression has a paradoxical effect on the frequency of obsessional intrusions.

Limitations of Previous Research

There are several limitations with the thought suppression literature to date. First, there is a reliance on non-clinical samples. This could potentially explain why no paradoxical effects have been found, yet studies recruiting OCD samples have also failed to demonstrate immediate enhancement and rebound effects (Janeck & Calamari, 1999; Purdon, Rowa & Antony, 2005). Numerous other methodological issues have been highlighted (e.g. Purdon, 2004; Abramowitz et al, 2001; McLean & Broomfield, 2006), including a reliance on unselected student samples, a lack of research into

personally significant thoughts, a reliance on lab-based experiments lacking ecological validity, poor control conditions and a lack of baseline thought frequency data. There are also difficulties regarding the measurement of thought occurrences. Purdon (2004) has argued that the unit of measurement in thought suppression paradigms is flawed, specifically because measuring thought frequency alone fails to address thought *duration* (Purdon, 2004). It is proposed that thought dismissal (the ability to remove a thought from conscious awareness) should also be considered. Dismissal is viewed as a reactive strategy (Clark, 2004), contrasting with thought suppression which may be viewed as more proactive by preventing a thought coming to mind. Interestingly, it has been found that OCD patients reactively suppress (i.e. dismiss) their thoughts significantly more than they proactively thought suppress (Purdon, Rowa & Antony, 2007). However, this distinction has not been given much consideration in thought suppression studies to date. The conceptualisation of thought suppression is also problematic. Its definition is vague and it remains unclear if and how ‘suppression’ differs from other avoidant mental processes such as distraction (Smari, 2001). Indeed, failures in suppression may be due to *unfocussed* distraction methods (Wegner et al, 1987; Kelly & Kahn, 1994). Furthermore, the instruction to suppress may elicit a whole range of strategies, some of which may intensify thought occurrences more than others. Maladaptive mental control strategies associated with OC symptoms, such as punishment and worry (Abramowitz et al, 2003; Tolin et al, 2007), may be particularly relevant.

Beyond Thought Occurrence

It is unlikely that thought suppression has a straightforward effect on the frequency of intrusions. As discussed, cognitive models assume an interactional relationship between suppression and maladaptive thought appraisals, mood state and thought occurrences (Salkovskis, 1985; Wells & Matthew, 1994). Therefore, rather than increasing thought frequency, suppression may impact on distress or appraisals.

There is some evidence that suppression leads to increased distress in non-clinical (Trinder & Salkovskis, 1994; Marks & Wood, 2005) and clinical samples (Najmi, Riemann & Wegner, 2009).

However, this has not been consistently demonstrated. In fact, suppression may even have a short-term positive effect in reducing distress levels associated with ‘thought-action-fusion’ type intrusions in non-clinical samples (Rassin, 2001). These inconsistencies in relation to distress may be explained by considering appraisals of intrusive thoughts. Purdon (2001; 2005) demonstrated in both clinical and non-clinical samples that appraisals of thought recurrence (specifically the negative personal implications of having the thought or likelihood of the thought coming true) were predictive of distress, regardless of experimental instructions to suppress. Overall, it appears that suppression may have a complex relationship with other maintaining factors in OCD.

Rationale

If thought suppression is indeed a maintenance factor in dominant psychological models of OCD (Salkovskis, 1985; Rachman, 1997, 1998; Wells & Matthew, 1994), one would expect the paradoxical effect of suppression to be demonstrable empirically. However, research to date has failed consistently to show this effect, raising doubt about whether suppression does, in fact, lead to enhanced thought frequency. It is possible that methodological issues in the extant literature may have prevented detection of such effects. This study aims to address some of these limitations by: a) conducting a naturalistic study over a period of 1 week, conducted in participants’ day-to-day environment, b) recruiting an analogue sample of participants who rate highly on measures of obsessionality, c) targeting personally relevant intrusive thoughts, and d) measuring baseline thought frequency using an initial monitoring period. As suggested by Purdon (2004), a measure of thought ‘dismissability’ and thought duration will be included. The study will also consider the wider impact of thought suppression on distress in response to intrusions and appraisals of intrusive thoughts.

Hypotheses

The aim of this study was to clarify the role of thought suppression in OCD by examining the suppression of obsessional intrusions in a non-clinical cohort. Three main questions were posed regarding whether deliberate thought suppression leads to: (1) an immediate enhancement and/or

rebound effect, (2) changes in the dismissability of intrusions, and (3) changes in distress levels. A controlled thought suppression paradigm (Figure 1) will be employed to examine these questions.

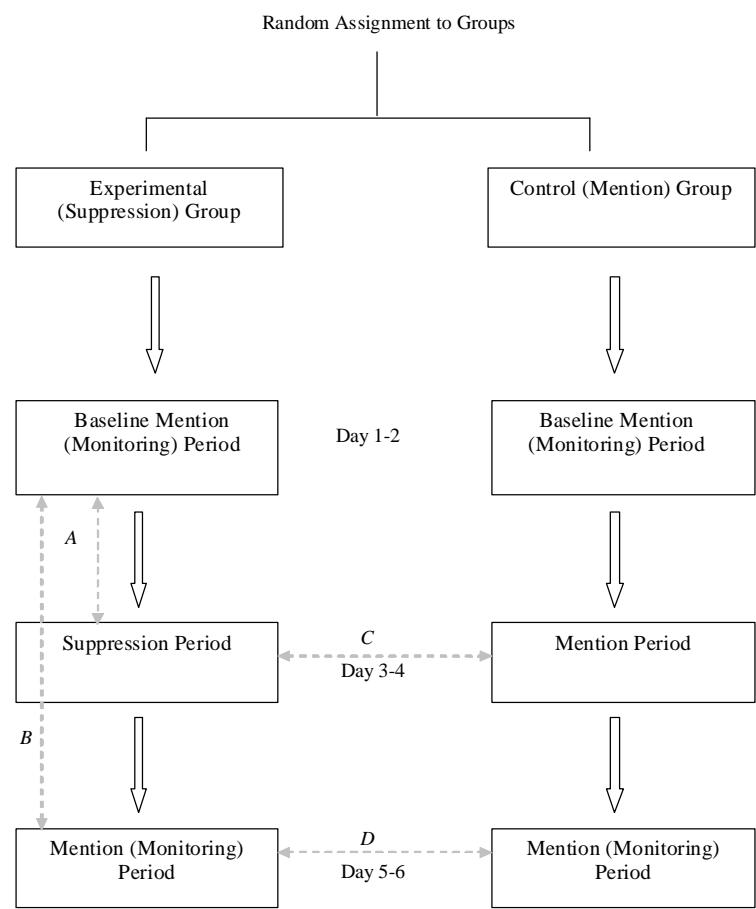


Fig. 1. Study Design.

(A) Immediate enhancement effect calculation: difference in thought frequency between baseline monitoring period and suppression period. (B) Rebound effect calculation: difference in thought frequency between baseline monitoring period and second monitoring period. (C&D) Comparisons between groups on thought frequency, distress & dismissability.

It is predicted that the instruction to suppress intrusive thoughts in a high obsessional cohort will:

1. Increase intrusive thought frequency during suppression and in the subsequent monitoring phase relative to baseline. That is, immediate enhancement and rebound effects are predicted.

2. Reduce dismissability (defined as the subjective ease with which intrusive thoughts can be removed from conscious awareness) of intrusive thoughts during suppression and in the subsequent monitoring phase relative to baseline.
3. Increase distress during suppression and in the subsequent monitoring phase relative to baseline.

In contrast to the suppression group, it is predicted that thought frequency, dismissability and distress will remain stable in the control (mention) group throughout the experiment. It is anticipated that differences between the groups will be present during suppression and subsequent monitoring phases. At these time points, higher thought frequency and anxiety and lower thought dismissability is predicted in the suppression group relative to the mention group.

Method

Design

This is a parallel group, controlled study with a 2 (group) x 3 (phase) mixed model design. Participants were randomly assigned to either a suppression or mention group and completed three consecutive experimental phases over seven days (baseline monitoring phase; suppression/monitoring phase; second monitoring phase). Six dependent variables were examined: thought frequency, duration, anxiety, dismissability, suppression success and unacceptability, the primary dependent variable being thought frequency.

Ethics

Ethical approval was obtained from the University of Glasgow Ethics Committee (approval documentation in Appendix II).

Power Calculation

Power calculations were completed (G-POWER; Erdfelder, Faul, & Buchner, 1996) based on hypothesis (1). Methodology used in previous research was not sufficiently comparable to estimate effect sizes for the current study. Therefore, Cohen's effect size (f) conventions for ANOVA (Cohen, 1977, 1988) were used with values of 0.1, 0.25 and 0.4 corresponding to "small", "medium" and "large" effect sizes, respectively. The following assumptions were made; rho was conservatively predicted to be 0.3, correlations between all possible pairs of repeated measures would be identical (as assumed with repeated measures ANOVA) and significance level was taken to be 0.05. Results indicated that for "medium" effect sizes, a total sample size of 40 would have adequate power (>0.80).

Participants

Undergraduate students from various schools (Arts, Life Sciences, Engineering & Maths) within the University of Glasgow were sent an invitation email asking if they experienced intrusive thoughts and whether they would like to participate in a study about such thoughts (Appendix III). A link to an electronic screening questionnaire (Clark-Beck Obsessive Compulsive Inventory - Obsessional Intrusions Subscale; Clark & Beck, 2002) and participant information sheet (Appendix IV) was provided. Between September 2010 and March 2011, 202 students completed the screening measure, of whom 166 met inclusion criteria, defined as a score of ≥ 12 on the Obsessions Subscale of the CBOCI (equating to one standard deviation below the clinical mean). Suitable participants were then contacted by email or telephone. Individuals receiving current psychiatric or psychological treatment were excluded (n=17), three declined and it was not possible to contact 70. Appointments were arranged with the remaining 76. Of these, four did not attend, three scored within the severe range of the Beck Depression Inventory (BDI-II; Beck, Steer & Brown, 1996), thereby meeting exclusion criteria, and five participants were not experiencing thoughts defined as 'obsessional intrusions' (Clark, 2004). A total of 64 participants gave written, informed consent and were randomised into the

study. Sixty one participants completed the experiment successfully and three withdrew (two due to external events and one due to distress associated with the thought monitoring procedure).

Measures and Materials

Pre Experimental Measures of Symptoms

Obsessive Compulsive Inventory – Revised (OCI-R; Foa et al, 2002)

The OCI-R is a revision of the Obsessive Compulsive Inventory (OCI; Foa et al, 1998) which consists of 18 items assessing the severity and frequency of OC symptoms. Each item is rated on a 5-point scale according to level of distress. The OCI-R demonstrates good internal consistency ($\alpha = 0.81$). A cut-off score of 21 distinguishes OCD patients from non-anxious controls (Foa et al, 2002).

Clark-Beck Obsessive Compulsive Inventory - Obsessional Intrusions Subscale (CBOCI; Clark & Beck, 2002)

The CBOCI is a 25 item screen for the frequency and severity of DSM-IV obsessive and compulsive symptoms, designed to complement the BDI-II. The CBOCI consists of validated subscales for obsessions and compulsions with each item rated on a 4-point scale (0-3). The measure demonstrates excellent internal consistency ($\alpha = 0.95$), good convergent validity ($r = 0.78$), and adequately distinguishes between clinical and non-clinical individuals.

The Beck Depression Inventory- Second Edition (BDI-II; Beck, Steer & Brown, 1996)

The BDI-II is a 21 item measure of the frequency and severity of depressive symptoms on a 4 point scale. The BDI-II is widely used and demonstrates good psychometric properties.

Pre and Post Experimental Measures

Appraisal and Distress Ratings

Visual Analogue Scales (VAS) were designed to assess levels of distress and key appraisals in relation to obsessional intrusions (Appendix V). The VAS comprised a 100mm horizontal line, anchored with descriptors at each end, such as '*not at all*' to '*extremely*'. The VAS scores were determined by measuring the distance between the start of the line and the respondents' ratings along the line. Appraisal scales were based on questions from Part II of the Revised Obsessive Intrusions Inventory (ROII; Purdon & Clark, 1994) which is designed to assess the appraisal and control of obsessive thoughts in non-clinical samples.

Experimental Measures

Frequency of Intrusive Thoughts and Daily Diary

A hand-held golf tally counter was given to participants to record daily frequency of intrusive thoughts, applied in similar studies (e.g. McLean & Broomfield, 2007; Marks & Woods, 2005). A daily diary was provided to record thought frequency and VAS ratings (Appendix VI). The diary included six VAS relating to daily target intrusions: time spent thinking about the thought, anxiety, ease of dismissal, suppression effort, suppression success and unacceptability of the thought. Compliance with experimental instructions was measured through VAS ratings of suppression effort.

Thought Control Questionnaire (TCQ; Wells and Davies, 1994)

The TCQ is a 30 item questionnaire to assess frequency of thought control strategies on a 4 point scale. The TCQ has 5 subscales (worry, distraction, punishment, social support and reappraisal) which possess adequate internal consistency ($\alpha=0.64-0.83$; Wells & Davies, 1994).

Procedure

The experiment was conducted over seven days with two face-to-face meetings taking place at the beginning and end of the seven day period. Each meeting lasted approximately 45 minutes.

Pre Experimental Meeting

Measures and Identification of Intrusive Thought

Participants provided demographic details (age, sex, subject school) and baseline measurements for the OCI-R and BDI-II). Participants completed a practice VAS item and then rated current anxiety. Participants were given a brief description of an intrusive thought (Appendix VII). A personally relevant intrusive thought experienced within the last week was then identified and ratings were made regarding its frequency and level of distress. A 30-second priming exercise was completed requiring participants to think about their chosen thought, followed by ratings of mood and ease of which the thought could be brought to mind. A VAS questionnaire assessing key appraisals in relation to the specific intrusive thought was then completed (Appendix V).

Thought Monitoring Instructions

Participants were given instructions to record their chosen thought over the next seven days by clicking on a golf tally, which they were instructed to keep with them at all times. A diary was provided to record daily thought frequency and daily VAS ratings (Appendix VI). All participants were then given recording instructions: *“For the next few days please follow these instructions. It doesn’t matter whether your chosen thought comes to mind often or not. It might or it might not, it can do either. However, if your thought does come to mind, please record each time it happens on your tally counter. It is important that you continue with these instructions until you receive a further text message instruction”*. Participants were then told that they would receive 2 further instructions by text message at 6am on days three and five of the week.

Suppression and Mention Groups

After the meeting, participants were randomly assigned using simple randomisation procedures (computerised random number generation) to either a suppression or mention group. The researcher was not blind to group. On day three, those assigned to the suppression group received the following instruction: *“For the next few days please follow these instructions. Try as hard as you can to*

suppress your chosen thought, that is, try not to allow your thought to enter your mind. However, if your thought does come to mind, please record each time it happens on your tally counter. It is important that you continue with this instruction until you receive the next text message". The mention group received the same instruction given at the first meeting. On day five, both groups received the same instruction from the first meeting. Instructions were based on those by Salkovskis and Campbell (1994).

Post Experimental Meeting

Participants completed the same VAS measures and the same 30 second thought priming task from the first meeting. The accuracy of the tally counter was rated from 0-100% (100% as completely accurate). Participants were also asked to describe the instructions received on day three and five. Participants were then asked a series of open ended questions regarding the experimental week, including methods used to control their thoughts. Finally, all participants completed the Thought Control Questionnaire (Wells & Davies, 1994) and were asked to rate this solely based on strategies employed on days three and four (phase two) of the experiment.

Analytic Strategy

Data were analysed using the Statistical Package for the Social Sciences (SPSS; Nie et al, 1975). All data were examined for normality and homogeneity of variance. Where appropriate, transformations were used (Howell, 1997). Independent *t*-tests for continuous data and Chi-squared (χ^2) tests for categorical data were used to examine differences in demographic data, baseline assessment measures and TCQ scores between groups (Table 1). Mann-Whitney *U* tests and Wilcoxon (T) tests were used for non-parametric continuous data. All effects were reported as significant at $p < 0.05$ and confidence intervals (CI) of 95% were applied unless otherwise specified. For brevity, only significant statistical results are referenced in detail (full results are provided in Appendix VIII).

To examine the main hypotheses, each dependent variable (see Table 2) was analysed using a mixed 2 (Group: suppression, mention) by 3 (Time: phase 1, phase2, phase 3) repeated measures ANOVA.

Greenhouse-Geisser (1959) corrections were applied when the assumption of sphericity was violated. Significant interaction effects were investigated using simple effects analysis. Within-group simple effects were analysed using separate repeated measures ANOVA for each group. For significant effects, post hoc comparisons between phases were completed using Bonferonni adjustments. Between-group simple effects were examined by ANOVAs at each level of phase, using the pooled error term from the original mixed repeated measures ANOVA and adjusting the degrees of freedom (Howell, 1997). Effect sizes (ES) were reported using partial eta squared (η^2 ; Cohen, 1988) which equates 2-12% of variance to small effects, 13-44% of variance to medium effects and 45%+ variance to large effects. Figures are presented using the mean and standard error of the mean (SEM).

Results

Preliminary Analyses

Sixty four participants were randomised to either a suppression (S) or mention (M) group. Of these, three withdrew (M=1, S=2). A further nine participants were excluded from the final analysis due to reporting a low number of thoughts throughout the week (total of ≤ 5 thoughts over course of experiment). These participants were not deemed to meet criteria for 'high obsessionality'. Therefore, a total of 52 participants were included for final analysis (S: 25, M: 27). Participants who had incomplete diary ratings (n=4) were excluded from analysis of the corresponding variables.

Participant Characteristics

Table 1 details participant characteristics for each group. In addition to the data presented in Table 1, participants categorised their target thought according to its 'last occurrence', 'frequency' and 'distress'. On these measures there were no significant differences between groups (Pearson's Chi-square = 0.14, 1.89, 8.31 respectively, $p > 0.05$). Most participants had experienced their target intrusion within the previous 24 hours (n=44), with the remaining being within the last week (n=8). The frequency of their intrusions ranged from once a week (n=1), a few times a week (n=13), once

per day (n=18) and several times per day (n=20). Most participants rated level of distress associated with their intrusions as moderate (n=20) or great (n=20), followed by a little (n=9), minimal (n=2) and extreme (n=1). Significant differences between groups were found on the CBOCI, OCI-R and BDI-II (Table 1), although groups scored within the same clinical ranges on the CBOCI (*mild-moderate* range) and BDI (*mild* range), and met clinical cut-off scores on the OCI-R (>21). Given these differences, additional mixed model repeated measures ANOVAs for all dependent variables were completed with CBOCI, OCI-R and BDI-II entered as covariates (Appendix VIII). All significant interactions from the original repeated measures ANOVAs remained significant and no additional significant findings emerged. Therefore, all analyses reported do not include CBOCI, OCI-R and BDI as covariates.

Table 1
Participant Characteristics and Corresponding Analysis

Characteristic (Units)	Suppression (n=25)	Mention (n=27)	Statistic
Sex (Female:Male ratio)	19:6	19:8	$\chi^2 = 0.2$, $p=0.647$
Age (mean, SD)	20.28 (2.70)	20.81 (2.98)	$T = 677$, $p=0.502$
CBOCI-Intrusions Subscale (mean, SD)	18.60 (5.72)	22.70 (4.72)	$U = 501.5$, $p=0.003^*$
OCI-R (mean, SD)	22.80 (10.78)	29.67 (12.22)	$U = 458$, $p=0.03^*$
BDI (mean, SD)	12.04 (7.71)	16.78 (6.51)	$U = 466$, $p=0.02^*$
Intrusion Category (N):			
Doubt	9	12	$\chi^2 = 6.42$, $p=0.267$
Harm to self/others	8	9	
Symmetry/Exactness	4	1	
Unacceptable Sex	2	3	
Contamination	2	0	
Other	0	2	

*Significant results. CBOCI: Clark-Beck Obsessive Compulsive Inventory, OCI-R: Obsessive Compulsive Inventory-Revised, BDI: Beck Depression Inventory. SD: standard deviation, χ^2 : Chi-Squared Test, U: Mann-Whitney U Test.

3.1.2 Compliance with Experimental Instructions

Suppression effort ratings were examined to measure compliance with experimental instructions. A significant phase x group interaction was found [$F(1.7, 82.4)=11.27$, $p<0.001$, $\eta^2=0.190$]. Repeated measures ANOVA for each group revealed a significant phase effect for the suppression group [$F(2, 46)=20.99$; $p<0.001$, $\eta^2=0.48$], but not the mention group [$F(1.5, 37.8)=1.17$; $p=0.31$, $\eta^2=0.045$]. Post hoc analyses for the suppression group found a significant increase in suppression effort between phases 1 and 2 [mean: 31.46, CI: 47.15 - 15.77; $t=2.21$, $p<0.001$] and a significant decrease between phases 2 and 3 [mean: 31.33, CI: 19.33 - 43.33; $t=6.74$, $p<0.001$]. ANOVAs at each level of phase

found a significant difference between groups at phase 2 [$F(1, 130)=23.2, p<0.001$]. This indicates compliance with experimental instructions as significantly higher suppression effort was elicited in the suppression group (mean=76.69, SD: 20.09) compared to the mention group (mean=51.29, SD: 23.39) during the suppression phase.

Tests of the Main Hypotheses

Table 2 provides a summary of the main findings from the experimental week.

Table 2

Diary Ratings of Target Intrusion Across Groups and Experimental Phases.

Dependent Variable (units)	Suppression (n=25) <i>Mean (SD)</i>	Mention (n=27) <i>Mean (SD)</i>
<i>Phase 1: Monitor</i>		
Tally frequency (number of thoughts)	13.54 (14.45)	10.07 (15.63)
Time spent thinking about intrusion (0-100)	34.92 (16.15)	34.24 (19.80)
Anxiety (0-100)	34.67 (20.82)	40.12 (23.93)
Dismissability (0-100)	52.89 (18.19)	55.35 (20.65)
Suppression success (0-100)	45.52 (20.05)	55.90 (21.92)
Unacceptability (0-100)	23.35 (30.73)	41.12 (29.50)
<i>Phase 2: Instructional Phase</i>		
Tally frequency (number of thoughts)	9.10 (12.48)	11.87 (14.89)
Time spent thinking about intrusion (0-100)	26.06 (19.45)	46.43 (20.57)
Anxiety (0-100)	31.65 (22.71)	51.10 (19.77)
Dismissability (0-100)	59.17 (16.36)	52.25 (21.30)
Suppression success (0-100)	61.27 (21.40)	52.02 (23.31)
Unacceptability (0-100)	19.57 (28.63)	42.54 (31.19)
<i>Phase 3: Monitor</i>		
Tally frequency (number of thoughts)	9.76 (14.24)	11.89 (15.13)
Time spent thinking about intrusion (0-100)	27.08 (20.50)	44.87 (18.17)
Anxiety (0-100)	30.04 (21.99)	49.10 (17.76)
Dismissability (0-100)	54.35 (21.62)	52.75 (16.26)
Suppression success (0-100)	54.15 (21.05)	53.08 (21.12)
Unacceptability (0-100)	20.37 (29.59)	42.10 (28.12)

Effects of Suppression on Thought Frequency

Two measures of target thought occurrences were employed (tally counter score and time spent thinking about the thought). Pearson correlation coefficients between these measures at phase 1 (0.58), phase 2 (0.56) and phase 3 (0.70) were significant ($p<0.001$). Consequently, only analyses for tally frequency are reported. A square root transformation was applied to tally frequency data. A significant phase x group interaction was found [$F(1.6, 81.3)=13.61, p<0.001, \eta^2=0.214$], see Figure

2. Examination of the groups separately revealed a significant effect of phase for the suppression group [$F(1.4, 34.4)=13.91$; $p<0.001$, $\eta^2=0.367$], but not the mention group [$F(2, 52)=1.81$; $p=0.17$, $\eta^2=0.065$]. Post hoc analyses for the suppression group showed that compared to phase 1, significantly lower thought frequency was recorded during phase 2 (raw mean difference: 4.44; CI: 1.28-7.60; $t=4.3$ $p=0.001$) and phase 3 (raw mean difference: 3.78, CI: 0.09-7.65; $t=3.8$, $p=0.003$). This indicates significantly *fewer* thoughts were recorded both during suppression and post suppression compared to baseline. ANOVAs at each level of phase revealed no significant differences in thought frequency between the groups at any phase ($p>0.05$). Mean tally accuracy was rated as 87.5% (SD=9.4), with 100% being extremely accurate.

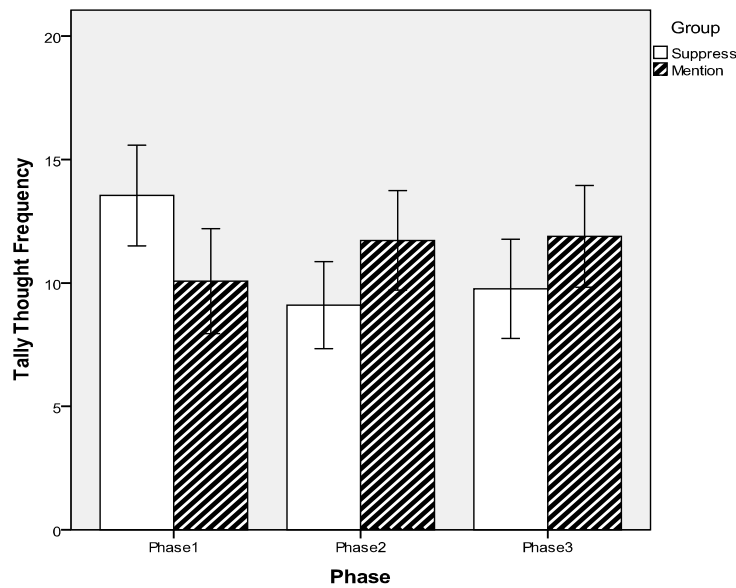


Fig. 2. Mean Thought Frequency Across Phase. Bars represent SEM (+/-1).

Effects of Suppression on Dismissability

No significant effects were found (phase [$F(2, 94)=0.29$, $p=0.75$, $\eta^2=0.006$]; group [$F(1, 47)=0.22$, $p=0.64$, $\eta^2=0.005$]; phase x group interaction [$F(2, 94)=1.27$, $p=0.29$, $\eta^2=0.026$]).

Effect of Suppression on Anxiety

A significant effect of group [$F(1, 48)=8.72$, $p=0.005$, $\eta^2=0.154$] and phase x group interaction [$F(2, 96)=3.68$, $p=0.029$, $\eta^2=0.071$] effect were demonstrated, see Figure 3. Separate repeated measures ANOVAs per group found a significant phase effect for the mention group [$F(2, 50)=3.96$; $p=0.025$, $\eta^2=0.14$], but not the suppression group [$F(2, 46)=0.64$; $p=0.53$, $\eta^2=0.027$]. Post hoc analyses revealed a significant increase in anxiety in the mention group between phases 1 and 2 only (mean: 10.98, CI: 21.19 - 0.77; $t=2.76$ $p=0.032$). ANOVAs at each level of phase found significantly higher ratings of anxiety in the mention group at phase 2 [$F(1, 93.2)=11.10$, $p=0.001$] and phase 3 [$F(1, 93.2)=13.65$, $p<0.001$].

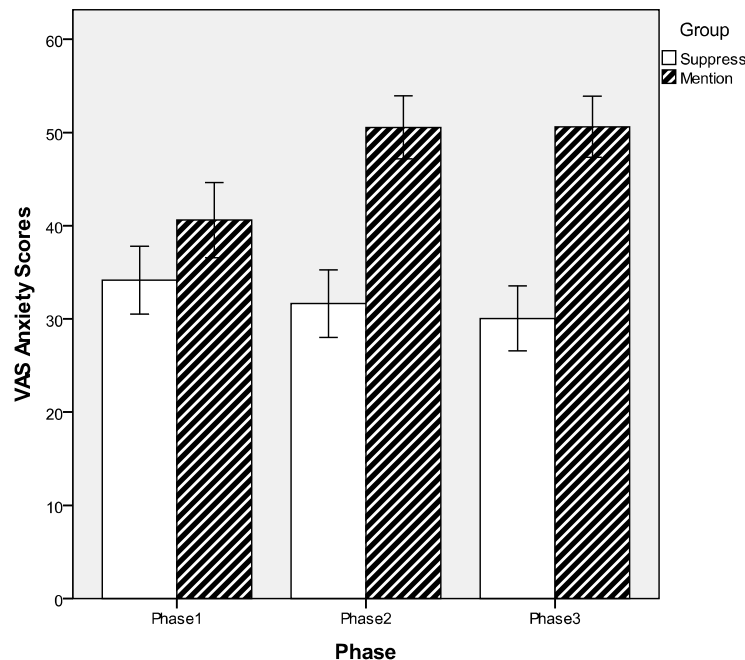


Fig. 3. Mean Anxiety Across Phase. Bars represent SEM (+/-1).

Additional Variables

Suppression Success

A significant phase x group interaction [$F(1, 96)=5.84$, $p=0.04$, $\eta^2=0.109$] was found. Separate repeated measures ANOVA revealed a significant effect of phase for the suppression group [$F(2,$

46)=5.77, $p=0.006$, $\eta^2=0.201$], but not the mention group [$F(2, 50)=0.65$; $p=0.52$, $\eta^2=0.025$]. Post hoc analyses in the suppression group revealed that ‘suppression success’ significantly increased during suppression relative to baseline (mean: 15.75, CI: 29.07-2.43; $p=0.017$). ANOVA at each level of phase showed no significant differences in ‘suppression success’ between the groups at any phase ($p>0.05$).

Unacceptability

A square root transformation was applied to the unacceptability data. A significant group effect was found [$F(1, 47)=8.68$, $p=0.005$, $\eta^2=0.156$]. This indicates that the mention group (raw mean=41.91, SD: 29.60) gave significantly higher unacceptability ratings compared to the suppression group (raw mean=21.01, SD: 29.65) throughout the experiment.

Thought Control Strategies

Independent *t*-tests were used to examine differences in thought control strategies during phase two (see Table 3). The suppression group used significantly more distraction, whilst the mention group used significantly more punishment and reappraisal.

Table 3
Thought Control Strategies in Phase 2 (Instructional Phase) by Group

TCQ Sub Scale	Suppression (n=24 ^a) <i>Mean (SD)</i>	Mention (n=27) <i>Mean (SD)</i>	<i>t</i>
Distraction	16.13 (4.27)	13.63 (3.42)	2.24, $p=0.030^*$
Punishment	8.54 (2.00)	11.59 (2.50)	4.97, $p<0.001^*$
Re-appraisal	10.21 (2.77)	15.26 (3.43)	5.50, $p<0.001^*$
Worry	9.00 (2.09)	10.19 (3.21)	1.21, $p=0.235$
Social Control	8.96 (3.20)	7.93 (2.88)	1.24, $p=0.220$

^aOne participant excluded due to incomplete data set. *Significant results.

Post Experimental Appraisal Ratings of Target Intrusion

Pre and post experimental appraisal ratings were analysed to examine whether the experimental manipulation had any effect on the interpretation of target intrusions (see Appendix VIII for raw data). Accordingly, change scores were calculated between pre and post-experimental VAS ratings. Mann Whitney tests found no significant differences in change scores between groups on any

appraisal scale ($p>0.05$). Exploratory Wilcoxon tests were also conducted to examine pre and post-experimental VAS changes *within* each group. The suppression group showed significant improvements on ratings of anxiety [median difference: 4; $T=77$, $p=0.037$], ease of dismissal [median difference: 11; $T=242.5$, $P=0.031$], suppression success [median difference: 18; $T=255.5$, $p=0.003$] and the need to eliminate the target thought [median difference: 20; $T=63.5$, $p=0.008$]. The mention group showed significant improvements on ease of dismissal [median difference: 19; $T=303$, $p=0.001$] and the need to eliminate [median difference: 7; $T=58.5$, $p=0.005$]. No other appraisal ratings were significantly different post-experiment ($p>0.05$).

Discussion

Main Findings

The primary aim of this study was to investigate whether the instruction to suppress obsessional intrusions in a high obsessional cohort led to paradoxical increases in thought frequency, known as immediate enhancement and rebound effects. In fact, the study revealed that the suppression group experienced significantly fewer thoughts both during suppression and post suppression relative to baseline. There were also no significant differences in thought frequency between the groups in any phase of the experiment. This was corroborated by ratings of thought duration which were also reduced in the suppression group. Accordingly, this study fails to provide support for immediate enhancement or rebound effects of thought suppression.

The lack of immediate enhancement and rebound effects is consistent with other thought suppression studies using obsessional intrusions and incorporating baseline monitoring periods for comparison (e.g. Belloch et al, 2004; Janeck & Calamari, 1999; Marks & Wood, 2005). Results are also consistent with similar naturalistic studies in other areas such as trauma (Guthrie & Bryant, 2000; Rosenthal, 2007) and worry (McLean & Broomfield, 2007). Perhaps the ‘white bear’ suppression effect does not generalise to personally relevant thoughts (Kelly & Kahn, 1994). Alternatively, it has been proposed that rather than causing a paradoxical effect, thought suppression may prevent the

natural habituation (i.e. decline) of intrusions over time (Purdon & Clark, 2001). Several studies have supported this idea by demonstrating a *greater decline* in thought frequency in the control group relative to the suppression group (e.g. Purdon, 2001; Purdon et al, 2005). However, the current study is not in keeping with such an effect as there was no decline in thought frequency in the mention group over the course of the experiment.

Although absolute suppression was not achieved by the suppression group, the reduction in thought frequency was appraised positively, as measured by 'suppression success'. This is inconsistent with Purdon's suggestion that thought recurrences during suppression are viewed as failures in thought control which strengthen negative appraisals about intrusions (Purdon & Clark, 1999).

A secondary aim of the study was to consider the effects of thought suppression on dismissability of intrusive thoughts. Contrary to prediction, dismissability had improved significantly in the suppression group by the end of the experiment compared to pre-experimental ratings. No significant findings for dismissability emerged during the experimental phases, suggesting that the instruction to suppress had no impact on dismissability. To the author's knowledge, no other thought suppression paradigms have examined this variable, although, in general those with higher intrusion frequency and distress find dismissing thoughts more difficult (Clark, 1986). Neither frequency nor distress increased in the suppression group during the present experiment which may provide some explanation for the results.

A final aim was to consider the impact of thought suppression on levels of anxiety associated with target thought occurrences. The suppression group showed no significant changes in anxiety over time. In contrast, the mention group experienced an increase in anxiety in phases two and three relative to baseline. This differed from expectations that anxiety levels would remain stable over time in the mention group and may be explained by the higher symptomatology in this group. Alternatively, participants in the mention group may have become more distressed because they did not receive a specific strategy for dealing with their thoughts. In contrast, suppression instructions

may have provided a means to neutralise intrusions (Purdon, 2004), resulting in anxiety remaining stable. Several studies have demonstrated that suppression has no detrimental impact on anxiety (Corcoran & Woody, 2009; Belloch et al, 2004; Grisham & Williams, 2009; Marks & Wood, 2007). However, there is also evidence of increased distress in relation to suppression (Trinder & Salkovskis, 1994; Najmi et al, 2009). These inconsistencies are perhaps to be expected given the complex relationships between thought frequency, distress and thought appraisals. In this study, appraisals of thought unacceptability did not change in the groups over time, but were significantly higher in the mention group across all phases of the experiment. As in previous findings (e.g. Purdon et al, 2005), perhaps appraisals are important predictors of distress rather than the mere presence of thoughts.

In addition to the main aims of the study, it was felt important to assess suppression strategy during the instructional phase (phase two) of the experiment. Through both open ended questions and TCQ scores, distraction was found to be the main method used to suppress thoughts and was used significantly more by the suppression group compared to the mention group. Given that a reduction in thoughts was experienced during suppression, this suggests that distraction may be partially effective. This is consistent with findings of reduced thought frequency when thought suppression is combined with a distraction task compared to suppression alone (Wegner, 1987; Salkovskis & Campbell, 1994). In addition, relative to suppression, ‘focussed’ distraction appears to be effective in alleviating distress in relation to OC intrusions, with effectiveness found to be comparable to an ‘acceptance’ based strategy (Najmi et al, 2009). Smari (2001) suggests that employment of *focussed* techniques in general could underlie effective mental control. Indeed, the purported rebound effect may stem from *unfocussed* distractions efforts (Wegner et al, 1987). Therefore, in the current study, it is possible the use of adaptive suppression strategies (such as focussed distraction) prevented immediate enhancement and rebound effects.

In examining the main findings, it is important to consider the context of the study. Participants’ may be more adept at using thought control strategies in their everyday environment and may have greater

access to adaptive strategies in comparison to lab-based experiments. In other words, suppression in the real world may be more effective than in an artificial environment. What is meant by ‘suppression’ is also a source of debate. Suppression instructions in themselves are ambiguous (Smari, 2001) and may lead to a variety of different control techniques. This could explain inconsistent findings in the literature to date. Nevertheless, if we take the concept of ‘suppression’ as a whole, without considering individual differences in *how* participants suppress, results suggest that ‘suppression’ is an effective strategy, at least in the short-term. Indeed, treatment techniques akin to suppression, such as ‘thought stopping’ (Wolpe, 1958, 1973), are found to be effective in a variety of disorders (Bakker, 2009), including obsessional rumination (e.g. Emmelkamp, Kwee & Gwan, 1977; Leger, 1978).

Limitations

The sample was restricted to non-clinical, undergraduate students. Although participants were screened for obsessional intrusions and the cohort scored within clinical ranges on self-report measures of OCD, participants were not seeking help in relation to their intrusions. This limits the generalisability of the results.

Logistical constraints meant that each participant completed the study from Friday to Friday, with the baseline monitoring period falling on Saturday and Sunday. It is not known whether patterns of thought occurrences differ between weekends and weekdays and therefore, the validity of using these baseline data for within-group comparisons is uncertain. By conducting a naturalistic study, it was also impossible to control for situational factors that may have contributed to thought occurrences. It is believed that the use of text messages to deliver experimental instructions has not been previously employed in studies of this nature. Manipulation checks at the end of the study indicated that all participants received the instructions. However, data on when participants accessed and complied with instructions were not captured and therefore, it is possible that time spent in each phase was not entirely consistent amongst participants.

Like most research in this area, the study did not control for effects of social desirability on ratings of thought occurrences. This has potential relevance for the suppression group who may have reduced reporting of intrusions in line with instructions to suppress.

Finally, there were limitations in using the TCQ retrospectively. Reliability would have been increased by administering the TCQ at the end of phase two, but this was impractical. In addition, the TCQ was only administered post experiment and therefore, it is not possible to rule out baseline differences on TCQ scores between the groups. However, it was felt that pre-experimental administration of the TCQ may have influenced participants' behaviour during the experiment.

Clinical and Research Implications

Wegner et al's (1987) initial thought suppression paradigm has influenced theoretical models of psychological disorder and subsequent treatment techniques. Primary interventions for OCD, namely cognitive behavioural therapy (CBT) plus Exposure and Response Prevention ('The Matrix', 2009; NICE, 2006), generally discourage the use of thought suppression, citing Wegner's experiments in their rationale. Results from this study provide yet another contradiction to Wegner's findings, and in fact, suggest that suppression may have beneficial effects, at least in the short-term. This is an important finding in light of the expanding use of cognitive behavioural therapies and also acceptance and mindfulness based approaches which cite Wegner's studies in their rationale (e.g. Hayes et al., 1999). Although these latter approaches, aimed at relinquishing mental control, may be effective (e.g. Twohig et al, 2010), it is essential that we are clear on the underlying principles of their use. As it stands, we cannot assume that thought suppression leads to a paradoxical increase in frequency for all.

Overall, the causal role of thought suppression in OCD is certainly not clear-cut and perhaps theoretical models of OCD (e.g. Wells & Matthew, 1997) may need adjusted accordingly. As with all avoidant behaviours in OCD, suppression may still function to prevent exposure to intrusions, thereby preventing disconfirmation of catastrophic beliefs (Wells & Matthew, 1994). However, as advocated

by Rassin et al (2000), this suggests a more marginal role for suppression than previously believed. Consequently, in treatments which endorse the *paradoxical* role of suppression in OCD (e.g. Wells, 1997), a reduced focus on this may be warranted. As such, perhaps ‘banning thought suppression’ should no longer be a key therapeutic aim.

Given the difficulties in accurately defining ‘suppression’ and weak empirical evidence for its paradoxical role in OCD, it may be beneficial for future research to move beyond ‘thought suppression’ paradigms to examine specific mental control strategies. Some researchers are beginning to examine techniques such as the ‘acceptance’ of intrusive thoughts with promising findings in clinical (Najmi et al, 2009) and non-clinical samples (Marks & Wood, 2005). Further research on mental control strategies in clinical samples would increase the applicability of findings to practice. Naturalistic studies of such strategies in participants’ everyday environment would also increase ecological validity. Exploring the longer term outcomes of suppression, rather than over minutes or days, could also be of importance as detrimental effects may be more pronounced over time. Given the heterogeneous nature of obsessions (e.g. McKay et al, 2004), it would also be interesting to examine mental control techniques in relation to specific intrusive thought content. Certain intrusion sub-types may be more difficult to suppress than others, particularly those associated with greater unacceptability.

Conclusions

This study has demonstrated that thought suppression *does not* lead to a paradoxical increase in thought frequency in a high obsessional cohort, over a period of seven days. No other counterproductive effects of suppression were found on dismissability, anxiety or appraisals of intrusions. These findings contribute to a body of literature which fails to find a paradoxical effect of thought suppression in OCD. Clearly, this has implications for the refinement of theoretical models and treatments of OCD. Thought suppression, in terms of its purported role in increasing thought occurrences, should no longer be viewed as counterproductive for all. In fact, suppression may even constitute an adaptive *short-term strategy* within a repertoire of techniques.

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CHAPTER THREE: ADVANCED CLINICAL PRACTICE I -
REFLECTIVE CRITICAL ACCOUNT

The Personal and Professional Impact of Client Suicidal Behaviour

Susan Ralston¹

**¹ Academic Unit of Mental Health and Wellbeing, Institute of Health and Wellbeing,
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Abstract

Patient suicidal behaviour is a phenomenon which has both a personal and professional impact on clinicians. This reflective account explores the impact of client suicidal behaviour from a trainee clinical psychologist's perspective. I explore my experience of working with a suicidal adolescent and her attempted suicide whilst undergoing therapy. The emotional impact of this event is described. The reflection considers my own reactions against relevant theory and research on the topic. Implications for my working practice are described and thought is given to the wider implications for clinical psychologists and services as a whole. The reflective process is reviewed from an 'internal supervisor' (Casement, 1990) perspective and is evaluated in terms of its therapeutic benefit for the writer.

CHAPTER FOUR: ADVANCED CLINICAL PRACTICE II -
REFLECTIVE CRITICAL ACCOUNT

‘Recovery’ in Psychiatric Rehabilitation Services

Susan Ralston¹

**¹ Academic Unit of Mental Health and Wellbeing, Institute of Health and Wellbeing,
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Abstract

Mental health services, including psychiatric rehabilitation are beginning to adopt more 'recovery focussed' care. This approach is essentially client-centred, emphasising choice, control and empowerment over treatment. Goals of recovery move away from symptom improvement towards leading a fulfilling existence in spite of disability. This reflective account is based on one aspect of recovery based practice within a psychiatric rehabilitations service, specifically the empowerment and involvement of service users in their care and treatment. The account explores the implementation of staff training and new working practices aimed at enhancing the empowerment of service users in their treatment. Challenges of achieving this are discussed particularly in relation to current service models. The process of reflection is used to consider the wider role of the clinical psychologist within teams and organisations and to critically evaluate service delivery within psychiatric rehabilitation.

Appendix I. Submission Guidelines

Submission Guidelines for *Behaviour Research and Therapy* 2011. Full details can be accessed at:
http://www.elsevier.com/wps/find/journaldescription.cws_home/265/authorinstructions

The screenshot shows the 'Behaviour Research and Therapy' journal website. The header includes the journal title, a 'Contact us' link, a 'Help' icon, and an 'Editors' Update' notification. A navigation bar at the top lists links: home, main menu, submit paper, guide for authors, journal info, register, and log in. The main content area is titled 'Behaviour Research and Therapy' and welcomes users to the online submission and editorial system. It describes the journal's focus on experimental analyses of psychopathological processes, evidence-based treatments, and clinical practice. A 'Hints' section provides instructions for new and existing users. The right sidebar contains three sections: 'Author Information' (with links like Log in, Journal Information, and Author Information Pack), 'Reviewer Information' (with links like Log in, Reviewer Guidelines, and Tutorial for Reviewers), and 'Editor Information' (with links like Tutorial for Editors, Editors' Home, and Editors' Update). A 'Support & Training' section is also present at the bottom right. The footer includes a copyright notice for 2006-2011 Elsevier BV and a status bar showing 'Internet | Protected Mode: On' and a zoom level of 100%.

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Appendix II. Quality Rating Tool

Scoring	Items
Sample	
0-3	Convenience sample e.g. clinic attendees (2), geographic cohort (3), highly selective sample e.g. volunteers (1).
0 or 3	Greater than 27 participants in each treatment group or based on described and adequate power calculations.
0-3	Are sample characteristics described?
0-3	The treatment and control groups are similar at the start of the trial [item only included for studies with a 'non-suppression' control group]
0-3	The only difference between groups is the treatment under investigation [item only included for studies with a 'non-suppression' control group]
Control	
0-3	Is there a control group: 'non suppression' group (3), 'non PTSD/ASD' group (0), none (0) [Double weighted item]
Design	
0-3	The study addresses the effects of thought suppression with clear question & outcomes described?
0-3	Design parallel (3), crossover but controls for effects (2), crossover but no controls for effects (1).
0-3	Baseline thought frequency period? [Minus 1 point if baseline phase follows diagnostic assessment]
0 or 3	Follow up thought frequency period after suppression phase?
Suppression Procedures	
0-3	Manipulation instructions clearly described.
0 or 3	Number of times target thought mentioned in instructions consistent across all phases [Double weighted item]
0-3	Method of recording thought frequency described.
0 or 3	Includes a measure of suppression effort or indicator of compliance with instructions.
Allocation [only for 'Type A' studies with a 'non-suppression' control group]	
0 or 3	Is there random allocation to groups.
0-3	Is the process of randomisation described and independent.
Assessment	
0-3	Were participants assessed for PTSD/ASD according to Diagnostic Criteria using clinical interview (3), using self report standardised assessments (2), idiosyncratic (1).
0-3	Was co-morbidity assessed for: standardised & linked to diagnostic criteria (3), standard measures but not diagnostic (2), idiosyncratic assessments of symptoms (1)?
0-3	Are there measures of distress and affect during experiment (e.g. SUDS, Mood)?
0 or 3	For studies calculating percentage thought frequencies, are calculations carried out by independent assessors (1), inter-rater reliability checked by correlation with other raters (2), blinding used for experimental blocks (3).
Analysis	
0-3	The analysis is appropriate to the design, hypotheses and the type of outcome measure (e.g. analysing thought frequency by group and block)
0-3	Were between subjects and within subjects analyses completed?
0 or 3	Were effect sizes reported if relevant?

Scoring Guide: Well covered (3), Adequately addressed (2), Poorly addressed (1), Not addressed (0), Not reported (0), Not applicable (0). Unless otherwise specified, scoring for each item requires a judgement from 0-3 based on the scoring guide. **Scoring Calculation:** Applicable items are summed and divided by the total number of applicable items per study, multiplied by 100.

Appendix III. Quality Criteria Guide for Research Employing Thought Suppression Paradigms

Study Category	Key Criteria	Score (%)
High	A. Non suppression control group ('Type A' Study) B. Adequate sample size or based on power calculation C. Plus: <ul style="list-style-type: none"> - Standardised assessment of PTSD/ASD and co-morbidities - Target thoughts personally relevant - Consistent mention of target thought across instructional phases - Valid baseline monitoring period - 'Mention' thought monitoring procedures 	$\geq 85\%$
Moderate	<ul style="list-style-type: none"> • Meets A or B for high criteria • Does not meet one or more of high criteria C 	65-84%
Low	<ul style="list-style-type: none"> • Does not meet A & B • Plus significant bias in thought monitoring procedures or instructions 	51-64%
Very Low	<ul style="list-style-type: none"> • Failure to meet 'low' criteria <i>plus</i> design insufficient to address question posed in review. 	$\leq 50\%$

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Appendix II. Ethics Approval Letter



Ms Susan Ralston
C/o Professor Kate Davidson
Department of Psychological Medicine
Academic Centre
Gartnavel Royal Hospital
Glasgow
G12 0XH

16 September 2010

Dear Ms Ralston

Medical Faculty Ethics Committee

Project Title: *The impact of thought suppression outside the laboratory: effects on thought frequency, dismissability and distress in an obsessional cohort.*

Project No.: FM06909

The Faculty Ethics Committee has reviewed your application and has agreed that there is no objection on ethical grounds to the proposed study now that the requested revisions have been incorporated. They are happy therefore to approve the project, subject to the following conditions:

- The research should be carried out only on the sites, and/or with the groups defined in the application.
- Any proposed changes in the protocol should be submitted for reassessment, except when it is necessary to change the protocol to eliminate hazard to the subjects or where the change involves only the administrative aspects of the project. The Ethics Committee should be informed of any such changes.
- If the study does not start within three years of the date of this letter, the project should be resubmitted.
- You should submit a short end of study report to the Ethics Committee within 3 months of completion.

Yours sincerely

A handwritten signature in black ink, appearing to read 'D. Shaw'.

PP Dr David Shaw
Faculty Ethics Officer

Dr D Shaw
Lecturer in Ethics & Ethics Officer

School of Medicine, University of Glasgow, 378 Sauchiehall
Street, Glasgow, G2 3JZ

Tel: 0141 211 9755
E-mail: david.shaw@glasgow.ac.uk

Appendix III. Email Advertisement

Would you like to take part in a research study about repetitive, unwanted or unpleasant thoughts?

We can all experience these types of thoughts, especially when under stress, for example during exams times.

This study is interested in finding out how people cope with these thoughts in a student population so that we can help develop our understanding and treatment of mental health problems.

I am looking for people who experience **any type of unwanted thoughts**. It doesn't matter what these thoughts are about as there is a wide variety but here are some common examples:

- o thoughts that you left an appliance on that might cause a fire
- o image of a loved one having an accident
- o the thought that objects are not arranged perfectly
- o a thought or image that is contrary to your religious or moral beliefs
- o an impulse to say something rude or embarrassing
- o the thought of running the car off the road or into oncoming traffic
- o the thought that you didn't lock the door and someone may break in

Don't worry if you are not sure whether you are suitable. The first part of the study involves **filling out a short questionnaire** to help us decide whether you are eligible to participate. At this stage there is no commitment to be involved further. After completing the questionnaire and if you meet our entry criteria, we will invite you to participate in the second part of the study which involves 2 short meetings with our researcher, one week apart and will involve monitoring your thoughts in between these meetings.

If you are interested please click on this link: <http://www.surveymonkey.com/s/glasgowthoughtstudy> to fill out a 5 minute questionnaire and to find out further information about the study.

Thank you in advance for any help you can provide with this research study. I am a postgraduate student and your input will help towards completion of my doctoral qualification and will provide much needed information to advance psychological treatments.

Susan Ralston (BSc Hons)

Trainee Clinical Psychologist
Department of Psychological Medicine
Gartnavel Royal Hospital
Glasgow
G12 0XH

Email: glasgowthoughtstudy@gmail.com

Research supervised by Professor Kate Davidson

Appendix IV. Participant Information Sheet and Consent Form



Glasgow Intrusive Thought Study

Participant Information Sheet

Study Title: Investigating the effects of thought suppression on intrusive thoughts.

You are being invited to take part in a research study. Before deciding whether you wish to participate, it is important to read the following information so that you understand why the research is being carried out and what your participation would involve. Please take the time to read the information carefully and consider whether you wish to take part.

What is the study about?

The study is about 'intrusive thoughts'. An 'intrusive thought' is the name given to unpleasant or unwanted thoughts or images that pop into your mind unexpectedly. Nearly everyone has intrusive thoughts. This study wants to find out what happens when people try to stop having intrusive thoughts. It is hoped that findings from this research will improve our understanding of how intrusive thoughts seem to persist.

Why have I been asked to take part?

This study is looking at intrusive thoughts in a non-clinical population. It is hoped that this will improve our understanding of the experience of intrusive thoughts in clinical populations such as in individuals with Obsessive Compulsive Disorder. This may lead to ideas for both research and for improvements in clinical practice with people who seek help from mental health services because of their intrusive thoughts.

Do I have to take part?

Taking part in this study is entirely voluntary. If you do decide to take part, you will be asked to keep this information sheet and to sign a consent form. You will receive a copy of your signed consent form. If you decide to take part you are free to withdraw from the study at any time, without providing an explanation. Any information collected from you would then be destroyed.

What will happen if I decide to take part?

There are 2 parts to this study.

Stage 1: You will be asked to fill out an electronic questionnaire about your intrusive thoughts through a link to the website [surveymonkey.com](https://www.surveymonkey.com). This questionnaire will take about 10 minutes to complete. If you meet our entry criteria you will then be contacted by telephone and asked some

questions about your current physical and mental health in order to establish whether you meet criteria for taking part in stage 2.

Stage 2: Participation in stage 2 will involve 2 short, individual sessions with the researcher at a time of your convenience. Meetings will take place at the Public Health Department, University of Glasgow Campus, 1 Lilybank Gardens. Each of these sessions will last approximately 30 minutes and there will be a period of 1 week between them. At the first session you will be asked to identify one of your intrusive thoughts and asked to provide some ratings about it. During the week you will be asked to keep a record of how often you experienced your identified thought. This should take no more than a few minutes each day. In the second session, you will be asked to provide some more ratings about your chosen thought.

What are the possible disadvantages and risk of taking part?

There are no known risks of taking part in a study of this sort. This type of study has been used by many researchers and is commonly completed with help from student volunteers. The study will take up a small amount of your time and you may find it slightly uncomfortable to monitor unwanted thoughts. However, we do not predict that that you will experience any adverse effects. If you find any aspect of the study unpleasant then you should let the researcher know. It is stressed that your participation is voluntary and that you are free to withdraw at any time.

What are the possible benefits of taking part?

There are no direct benefits for you. However, it is hoped that this research will generate ideas for future research and lead to improvement in treatments for intrusive thoughts in clinical populations.

Will my taking part in this study be kept confidential?

Yes. All information will be kept strictly confidential in accordance with the Data Protection Act 1998. You will be identified by an ID number and any information about you will have your name and address removed so that you cannot be recognised from it. Your data will be stored securely in a locked filing cabinet in the Department of Psychological Medicine. Electronic data will be stored on an encrypted, password protected laptop from the University of Glasgow. At the end of the study this data will be transferred to a secure NHS computer drive, accessed only by the researcher. Your online questionnaire will be stored confidentially in a password protected, surveymonkey account and then downloaded and stored as per electronic data. All data will be stored for a period of 10 years and then destroyed. Your GP may be informed if the researcher becomes concerned about your physical or mental well-being (e.g. if it seemed you were suffering from severe depression). Every attempt would be made to discuss this course of action with you before contacting your GP.

What will happen to the results of this research study?

The results will be submitted for examination as part of the requirement for the Doctorate in Clinical Psychology at the University of Glasgow and it is hoped that the study will be published in a scientific journal. Your identification will not be included in any publication. Participants will be provided with a summary of the research findings on request with the researcher.

Who is organising and funding the research?

Department of Psychological Medicine, University of Glasgow.

Who has approved the study?

The study has been reviewed and approved by the Department of Psychological Medicine, University of Glasgow and the University of Glasgow Research Ethics Committee.

Contact for further information

If you wish to discuss any points covered in the information sheet or wish to ask any questions about the study, please do not hesitate to get in contact with **Susan Ralston** or my supervisor at the contact details below:

Susan Ralston
Trainee Clinical Psychologist

Professor Kate Davidson
Academic Supervisor

Department of Psychological Medicine
Gartnavel Royal Hospital
Glasgow, G12 0XH
Telephone or text: 07901602024
(available Mon-Fri, 9am-5pm)
Email: glasgowthoughtstudy@gmail.com

Department of Psychological Medicine
Gartnavel Royal Hospital
Glasgow, G12 0XH
Email: kate.davidson@glasgow.ac.uk

THANK YOU FOR READING THIS INFORMATION SHEET. PLEASE KEEP A COPY FOR REFERENCE.

Consent Form

Project Title: Investigation into the effects of thought suppression on intrusive thoughts.

Name of Researcher: Susan Ralston

**Check the three statements given below and give you name and date below.
Please save a copy of your completed consent form**

1. I can confirm that I have read and understand the information sheet for the above study and that I have had the opportunity to ask questions

YES

2. I understand that my participation is voluntary and that I can withdraw at any time, without giving any reason, without my legal rights being affected.

YES

3. I agree to take part in the above study.

YES

Name of Participant (Print)

..... (Sign)

Date

Subject Identification Number for this trial:

Appendix V. Visual Analogue Scales

How much do you try to suppress your intrusive thoughts?

not at all

a great deal



How successful are you at suppressing your intrusive thoughts?

not at all

extremely



How important are your intrusive thoughts?

not at all

extremely



How guilty does this thought make you feel when it comes into your head?

not at all

extremely



When this thought comes into your head how much do you worry that you might act on it or that it might otherwise happen in real life?

not at all

a great deal



How difficult is it for you to eliminate this thought once it comes into your head?

not at all

extremely



How unacceptable is this thought?

not at all

extremely



How likely is it that the thought itself will come true in real life?

not at all

extremely



How important is it that you control, or suppress, this thought?

not at all

extremely

To what extent does having this thought signify harm/danger to yourself or others?

not at all

a great deal

When you have this thought, how responsible do you feel for harm occurring to yourself or to others?

not at all

a great deal

* Questions based on Part II of the Revised Obsessive Intrusions Inventory (ROII; Purdon & Clark, 1994)

Appendix VI. Daily Diary

DAY 1 (From my meeting with Susan until midnight) **DATE:** _____

- Tally counter score: _____
- Estimate the number of times that your chosen intrusive thought entered your mind during the day: _____

- How much time did you spend thinking about your chosen intrusive thought during the day?

no time at all all the time

- How much anxiety did your chosen intrusive thought cause you during the day?

none at all a great deal

- How much did you try to suppress your chosen intrusive thought during the day?

did not try tried my
at all hardest

- How easy was it to dismiss/get rid of your chosen intrusive thought during the day?

not easy at all extremely easy

- How unacceptable was your chosen intrusive thought during the day?

not at all extremely

- How much did were you unable to suppress your chosen intrusive thought during the day?

not at all a great deal

- Any comments:

Appendix VII. Description of Intrusive Thought*

We are interested in your experiences with **unpleasant and unwanted thoughts or images or impulses that pop into your mind unexpectedly**. Nearly **everyone has such experiences**, but people vary in how frequently these occur and how distressing they are. Some examples of the many possible negative intrusions are given below:

- X an impulse to do something shameful or terrible
- X the idea or image of harming someone you don't want to hurt
- X the idea that something terrible will occur because you were not careful enough
- X an unwanted sexual urge or image
- X the thought that you or someone else will become dirty or contaminated by a substance that may cause harm
- X the thought that you left an appliance on that might cause a fire
- X an image of a loved one having an accident
- X the thought that objects are not arranged perfectly
- X a thought or image that is contrary to your religious or moral beliefs
- X an impulse to say something rude or embarrassing
- X the thought of running the car off the road or into oncoming traffic
- X the thought that you didn't lock the door and someone may break in

Please note that we are NOT talking about daydreams or pleasant fantasies. Nor are we interested in general worries about health or finances or other family matters. Also, we are NOT talking about the sort of thoughts that accompany depression or low self-confidence. Rather, we ARE interested in thoughts, mental images or impulses that pop into your mind and that you experience as intrusive and inappropriate.

* Based on instructions from the Interpretation of Intrusions Inventory (III; Obsessive Compulsive Cognitions Working Group, 2005)

Appendix VIII. Results

Table 1

Mixed Repeated ANOVA Results without Covariates

Dependent Variable	Phase Effect*	Group Effect*	Interaction*
SQRT Thought Frequency	F(1.6, 81.3)=3.59, p=0.041, ES =0.067	F(1, 50)=0.09, p=0.764, ES=0.002	F(1.6, 81.3)=13.61, p=0.00, ES=0.214
Time	F(2, 100)=0.24, p=0.786, ES=0.005	F(1, 50)=7.99, p=0.007, ES=0.138	F(2, 100)=9.96, p=0.000, ES=1.66
Anxiety	F(2, 96)=0.92, p=0.402, ES=0.019	F(1, 48)=8.72, p=0.005, ES=0.154	F(2, 96)=3.68, p=0.029, ES=0.071
Suppression Effort	F(1.7, 82.4)=18.14, p=0.000, ES=0.274	F(1, 48)=1.37, p=0.25, ES=0.028	F(1.7, 82.4)=11.27, p=0.000, ES=0.190
Suppression Success	F(2, 96)=2.11, p=0.126, ES=0.042	F(1, 48)=0.00, p=0.997, ES=0.000	F(1, 96)=5.84, p=0.04, ES=0.109
Dismissability	F(2, 94)=0.29, p=0.75, ES=0.006	F(1, 47)=0.22, p=0.64, ES=0.005	F(2, 94)=1.27, p= 0.29, ES=0.026
SQRT Unacceptability	F(1.5, 71.4)=0.38, p=0.69, ES=0.008	F(1, 47)=8.68, p=0.005, ES=0.156	F(1.5, 71.4)=0.83, p=0.41, ES=0.017

*Significant results in bold

Table 2

Mixed Repeated ANOVA Results with Covariates

Dependent Variable	Phase Effect*	Group Effect*	Interaction*
SQRT Thought Frequency	F (1.6, 75.7) = 0.79, p=0.432, ES=0.017	F(1, 47) = 0.04; p=0.848, ES=0.001	F (1.6, 75.7) = 10.96; p=0.000, ES = 0.189
Time	F(1.8, 79.8)=1.23, p=0.294, ES=0.027	F(1, 45)=2.28, p=0.14, ES=0.048	F(1.8, 79.8)=8.35; p=0.001, ES=0.157
Anxiety	F(2, 90) = 0.32, p=0.724, ES=0.007	F(1, 45) = 4.19; p=0.047, ES=0.085	F(2, 90) = 3.32, p=0.041, ES=0.069
Suppression Effort	F(1.7, 77.7)= 3.07, p=0.060, ES=0.064	F(1, 45)=3.17, p=0.082, ES=0.066	F(1.7, 77.7)=8.05; p=0.001; ES=0.152
Suppression Success	F(2, 90)=2.72, p=0.072, ES=0.057	F(1, 45)=0.004, p=0.951, ES=0.000	F(2, 90)=3.74; p=0.028, ES=0.077
Dismissability	F(2, 88) = 0.63, p=0.534, ES=0.014	F(1, 44)=0.18, p=0.673, ES=0.04	F(2, 88) =0.60, p=0.547, ES=0.014
SQRT Unacceptability	F (1.5, 66)=0.26, p=0.771, ES=0.006	F(1, 44)=5.40; p=0.025, ES=0.109	F (1.5, 66)=0.79, p=0.497, ES=0.558

*Significant results in bold

Table 3

Repeated Measures ANOVA & Post Hoc Comparisons: Suppression Group

Variable	Main Effect*	Post Hoc Comparisons with Bonferroni correction (Difference Scores)
SQRT Thought Frequency	F(1.4, 34.4)=13.91; p=0.000, ES=0.367	Phase 1 vs. 2: 0.7, CI: 0.3-1.2; p=0.001* <i>Raw mean difference: 4.44; CI: 1.28-7.60</i> Phase 1 vs. 3: 0.8, CI: 0.3-1.3; p=0.003* <i>Raw mean difference: 3.78, CI: 0.09-7.65</i> Phase 2 vs. 3: -0.028, p=1.00
Anxiety	F(2, 46)=0.64; p=0.53	n/a
Suppression Effort	F(2, 46)=20.99; p=0.000, ES=0.48	Phase 1 vs 2: 31.5, CI: 47.2 -15.8, p=0.000* Phase 1 vs 3: 0.1, CI: 15.5 - -15.2, p=1 Phase 2 vs 3: 31.3, CI: 19.3 - 43.3, p=0.000*
Suppression Success	F(2, 46)=5.77, p=0.006, ES=0.201	Phase 1 vs 2: 15.75, CI: 29.07 - 2.43; p=0.017* Phase 1 vs 3: 8.6, CI: 20.53 - 3.28, p= 0.22 Phase 2 vs 3: 7.13, CI: -3.45 -17.70, p=0.29

*Significant results in bold

Table 4

Repeated Measures ANOVA & Post Hoc Comparisons: Mention Group

Variable	Main Effect*	Post Hoc Comparisons with Bonferroni correction (Difference Scores)
SQRT Thought Frequency	F(2, 52)=1.81; p=0.17, ES=0.065	n/a
Anxiety	F(2, 50)=3.96; p=0.025, ES=0.137	Phase 1 vs 2: 10.98, CI: 21.19 - 0.77, p=0.032* Phase 1 vs 3: 8.98, CI: 21.01 - -3.05, p=0.20 Phase 2 vs 3: 2.00, CI: -7.60 - 11.60, p=1.00
Suppression Effort	F(1.5, 37.8)=1.17, p=0.31, ES=0.045	n/a
Suppression Success	F(2, 50)=0.65, p=0.52, ES=0.025	n/a

*Significant results in bold

Table 5

ANOVAs at each level of phase (adjusting by pooled error term). Significant Results (*)

5.1 Thought Frequency (critical F between 3.92-4)

Phase	F Value (Rounded to 2 decimal points)	P Value
Phase 1 F(1, 89)	1.36	p>0.05
Phase 2 F(1, 89)	0.92	p>0.05
Phase 3 F(1, 89)	1.15	p>0.05

5.2 Anxiety (critical F between 3.92-3.89)

Phase	F Value (Rounded to 2 decimal points)	P Value
Phase 1 F(1, 93)	1.20	p>0.05
Phase 2 F(1, 93)	11.10	p<0.05*
Phase 3 F(1, 93)	13.65	p<0.05*

5.3 Suppression Effort (critical F between 3.92-3.89)

Phase	F Value (Rounded to 2 decimal points)	P Value
Phase 1 F(1, 89)	0.00	p>0.05
Phase 2 F(1, 89)	11.5	p<0.05*
Phase 3 F(1, 89)	0.33	p>0.05

5.4 Suppression Success (critical F between 3.92-3.89)

Phase	F Value (Rounded to 2 decimal points)	P Value
Phase 1 F(1, 89)	1.29	p>0.05
Phase 2 F(1, 89)	2.31	p>0.05
Phase 3 F(1, 89)	0.03	p>0.05

Table 6

Pre and Post Experiment Intrusive Thought Appraisals Ratings

Vas Ratings (0-100)	Suppress (n=25) <i>Median (ICR)</i>		Mention (n=27) <i>Median (ICR)</i>	
	Pre	Post	Pre	Post
Anxiety	63 (50)	56 (52)	72 (28)	71 (22)
Suppress Effort	50 (53)	49 (47)	78 (37)	71 (30)
Ease of Dismissal	26 (45)	45 (36)	23 (25)	40 (40)
Suppression Success	25 (38)	48 (32)	36 (23)	38 (31)
Guilt	23 (66)	3 (46)	58 (41)	62 (41)
Urge to act on	39 (87)	36 (63)	76 (44)	71 (35)
Need to eliminate	66 (41)	56 (50)	75 (23)	63 (40)
Unacceptability	20 (63)	8 (61)	58 (62)	60 (52)
Likelihood to happen	22 (58)	28 (57)	42 (50)	38 (55)
Control	64 (50)	59 (54)	65 (44)	72 (28)
Harm/danger	12 (84)	23 (48)	65 (62)	64 (59)
Responsibility	9 (48)	18 (66)	72 (75)	68 (63)
Avoidance	45(83)	47 (70)	68 (30)	65 (21)

Appendix X. Major Research Proposal

The impact of thought suppression outside the laboratory: effects on thought frequency, dismissability and distress in an obsessional cohort

Abstract

Background: Thought suppression is a form of mental control implicated in the development and maintenance of Obsessive Compulsive Disorder (OCD). Based on Wegner's research, thought suppression has been widely viewed to lead to a paradoxical increase in intrusive thought frequency. However, research has largely failed to replicate Wegner's findings, which may in part, be due to methodological limitations of studies to date.

Aims: To conduct a naturalistic experimental design to investigate the effects of thought suppression on intrusive thought frequency, distress and thought dismissability in a high obsessional cohort.

Method: 50 non-clinical, obsessive participants will be recruited into a controlled study on thought suppression. Participants will be randomly allocated to either a suppression or mention (control) group and will record intrusive thought frequency, distress and dismissability on a daily basis, for one week. Both groups will complete a baseline thought monitoring phase followed by an experimental phase whereby the suppression group will be asked to suppress their intrusive thoughts and the mention group will be told that they can think about anything they like. Both groups will then complete a further monitoring phase.

Applications: The proposed study will add to the current literature base by providing an ecologically valid investigation of thought suppression in a naturalistic setting. It is hoped that results will help to clarify the role of thought suppression in OCD and contribute to treatment of the disorder.

1. Introduction

Thought suppression

Thought suppression is viewed as a form of mental control that individuals may use to manage unwanted thoughts and emotions and refers to an ability to not think about certain thoughts or events. The concept of thought suppression stemmed from Wegner's (1987) classic 'white bear' study in which participants were instructed to either suppress or express a thought about a white bear. Wegner found that those who were asked to suppress the white bear experienced significantly more thought occurrences than the expression group. He coined this phenomenon the '*rebound effect*' (Wegner, 1994) which referred to the increase in thoughts experienced *following* a period of suppression. An additional experiment by Wegner (1987) also found an '*immediate enhancement effect*' which referred to an increase in thoughts experienced *during* the act of suppression.

The phenomenon of thought suppression has been implicated in many clinical disorders, including Generalised Anxiety Disorder, Depression, PTSD and Obsessive Compulsive Disorder (OCD). Thought suppression in OCD has received particular attention from researchers and theorists due to the pervasive nature of intrusive thoughts and the active resistance of such thoughts. Cognitive behavioural models of OCD have implicated the role of thought suppression in its development and maintenance (e.g. Rachman, 1997; Salkvokis, 1985).

Impact of thought suppression on thought frequency in OCD

Investigation of thought suppression in OCD has largely failed to find evidence to support the rebound effect. Only two studies to date have supported an immediate enhancement effect (Trinder and Salkovskis, 1994; Salkovskis and Campbell, 1994). A meta analysis of 28 thought suppression studies found a small negative effect size for an immediate enhancement effect and reported a small to

medium positive effect size (0.35) for the rebound effect (Abramowitz, 2001) indicating that suppression may in fact be effective over the short term. A recent systematic review of 11 studies on thought suppression (McLean & Broomfield, unpublished) found negative effects sizes from -0.05 to -0.70 for the rebound effect, therefore, suggesting limited support for the rebound effect of thought suppression in OCD.

The reason for this is unclear, although methodological limitations of the literature have been highlighted in reviews by Purdon (2004) and others (e.g. McLean & Broomfield, unpublished; Abramowitz, Tolin & Street, 2001). Key limitations to the current research base include:

- A lack of studies in clinical populations and a reliance on unselected student samples.
- Studies that have used emotionally neutral thoughts or thoughts which have no personal significance to participants.
- A reliance on lab based experimental sessions lacking in ecological validity.
- Lack of appropriate control conditions.
- Lack of baseline monitoring periods of intrusive thought frequency.

Beyond the Rebound Effect in OCD

Although research to date indicates that thought suppression may have a weak role to play on thought frequency, cognitive behavioural models of OCD implicate a relationship between suppression and variables such as thought appraisal, mood, thought reoccurrences and OC symptoms.

How individuals deal with thought reoccurrences is now becoming an important area for future research, particularly the ability to dismiss intrusive thoughts. Thought dismissal relates to the ability to remove a thought from conscious awareness and may be thought of as a type of 'reactive suppression' (Clark, 2004). This contrasts with thought suppression, which may be viewed as a type of proactive strategy. Thought dismissal appears to be relevant in OCD as patients have been found

to reactively suppress (i.e. dismiss) their thoughts far more than they proactively thought suppress (Purdon, Rowa & Antony, 2007). In support of investigating the role of dismissability further, Purdon has argued that future studies should consider not only thought frequency but thought dismissability, as thought frequency alone fails to address the *duration* of intrusive thought experienced (Purdon, 2004).

Recent research has focussed on the impact of thought suppression on distress and thought appraisal. Thought suppression has been found to lead to increased distress in non-clinical (Trinder & Salkovskis, 1994; Marks & Wood, 2005) and clinical samples (Najmi, Riemann & Wegner, 2009), however, these results have yet to be found consistently across studies. Purdon has proposed that thought suppression may prevent the natural habituation of obsessional thoughts via two pathways. Firstly, thought suppression terminates exposure to the thought, thus, preventing re-appraisal of the thought as non-threatening and secondly, instructions to suppress may prime beliefs that thoughts should be controlled (Purdon and Clark, 2001).

Cognitive models of OCD emphasise the role of appraisals in thought suppression and OC symptoms. Various appraisal models are proposed, including, Salkovskis's inflated responsibility model (Salkovskis, 1985, 1999), Rachman's misinterpretation of significance theory (Rachman, 1997, 1998), Wells's metacognitive model (Wells, 1997) and the cognitive control theory of obsessions (discussed by Clark, 2004). In support of the appraisal perspective, controlled thought suppression studies have found a relationship between the personal meaning of intrusive thoughts and discomfort and mood, irrespective of experimental condition (Purdon, 2001; Purdon 2005). Specifically, distress was found to be predicted by *in vivo* appraisals of thought re-occurrences. Findings from Rassin (2001) using a non clinical sample, indicate that suppression may also have a short term positive effect in reducing distress levels related to TAF like intrusions. This may be linked to suppression success as there is preliminary evidence that non clinical samples have greater success in suppressing their thoughts than those with OCD (e.g. Tolin, 2002). Inconsistent findings between thought suppression and distress may also be linked to the conceptualisation of thought suppression. Thought suppression is likely to

refer to a range of mental processes and therefore instructions to suppress may result in a host of strategies in addition to suppression. Maladaptive mental control strategies such as punishment and worry have been linked to OC symptoms (Abramowitz, 2003; Tolin, 2007) and are likely to impact on distress levels. Further research is needed into the complex relationship between intrusive thought appraisals, distress and thought suppression in order to understand the inconsistencies in current research findings.

Rationale

In light of the research findings to date, there appears to be some uncertainty about whether thought suppression leads to enhanced thought frequency in OCD. Additional data are needed to confirm the impact of thought suppression on distress and dismissability. These issues have theoretical, research and clinical applications and therefore it is pertinent that we gain a clearer perspective on the effects of thought suppression. The rationale for the current study is to investigate the effects of thought suppression on intrusive thoughts within a naturalistic environment, to gain an ecologically valid understanding of thought suppression over the longer term. The study would improve on methodological limitations apparent in the current literature by use of an experimental period of 1 week, conducted in participant's natural environment; use of an analogue sample of participants who rate highly on measures of obsessionality; use of personally relevant intrusive thoughts and the addition of a baseline monitoring period

2. Aims and Hypotheses

2.1 Aims

To conduct a naturalistic experimental design to investigate the effects of thought suppression on *thought frequency, distress and thought dismissability* in a non-clinical, high obsessional cohort (see appendix I for diagram of the experimental design).

2.2 Hypotheses

Is it hypothesised that the instruction to suppress intrusive thoughts, in a high obsessional cohort, will affect three variables - thought frequency, thought dismissability and distress. The experiment is a mixed model design and therefore the hypotheses reflect both within and between group comparisons.

It is predicted that:

1. *The instruction to suppress intrusive thoughts, in a high obsessional cohort, will **result in increased intrusive thought frequency within the suppression group**, during suppression and in the subsequent monitoring phase.*

That is, an initial enhancement and rebound effect is predicted. This means that intrusive thought frequency in the suppression group will be significantly greater during the experimental period in comparison to their baseline monitoring period and significantly greater in the post suppression monitoring period in comparison to the suppression period. It is not predicted that the monitoring group will present with this pattern of thought frequency, which is hypothesised to remain stable over time.

2. *The instruction to suppress intrusive thoughts, in a high obsessional cohort, will **reduce the dismissability of intrusive thoughts** within the suppression group relative to their baseline monitoring phase and in relation to the mention group.*

It is predicted that the suppression group will experience greater difficulty in dismissing their intrusive thought during the experimental phase of the study in comparison to their baseline monitoring phase and in comparison to the mention group. Dismissability will be defined as the subjective ease to remove intrusive thoughts from conscious awareness and will be measured by participants judgement on how easily their intrusive thought was dismissed during the experiment.

3. *The instruction to suppress intrusive thoughts, in a high obsessional cohort, will result in **increased distress levels** within the suppression group relative their baseline monitoring phase and in relation to the mention group.*

Specifically, it is predicted that distress levels will be greater during and post suppression compared to baseline distress levels and compared to mention group distress. *It is predicted that distress levels will be mediated by intrusive thought appraisals and mental control strategy* (as indicated by differences in appraisal rating scores and thought control scores between the suppression and mention group). This is an exploratory analysis and therefore specific predictions have not been made.

3. Plan of Investigation

3.1 Participants

A cohort of 50 ‘obsessive’ students from the University of Glasgow will be asked to participate.

3.2 Inclusion and Exclusion Criteria

Participants aged between 17 and 60, fluent in English and who have experienced intrusive thoughts within the past month will be eligible to participate. Potential participants will be screened for obsessionality (see measures and procedure section for further details) and *only those scoring highly for obsessive symptoms will be asked to participate* in the study. ‘High obsessive’ participants will be determined by scores of 12 or more on the Obsessions Subscale of the CBOCI (equating to one standard deviation below the clinical mean).

Potential participants who score below the cut off on the CBOCI will be excluded. Potential participants will also be excluded should they be receiving psychological or psychiatric treatment and also if they are experiencing severe levels of depression indicated on the screening measures.

3.3 Recruitment Procedures

Participants will be recruited by various means including via email, local advertisement (posters, commonly used websites and newspapers) and announcements during lectures. Students will be initially contacted via e-mail regarding the study. Students will be asked if they consider themselves to be “*bothered by unpleasant and unwanted thoughts that pop into your mind unexpectedly*” and whether they would be interested in participating in a study on intrusive or troublesome thoughts. In this case, they will be asked to contact the researcher and will be sent an information pack (via email) including a participant information sheet and a copy of the screening measure (Obsessional Subscale of the CBOCI). At this stage potential participants will also be asked to send contact details. Upon completion of this information, participants who meet the entry criteria will be contacted via telephone to arrange participation in the study. Please refer to Appendix II for Recruitment Flow Chart.

3.4 Measures

Obsessive Compulsive Inventory – Revised (OCI-R; Foa, Huppert, Leiberg, Langner, Kichic, Hajcak et al, 2002)

The OCI-R is a shorter revision of the original Obsessive Compulsive Inventory (OCI; Foa et al, 1998) which consists of 18 items that assess the severity and frequency of OC symptoms. Each item is rated on a 5 point scale according to level of distress, from 0 (not at all) to 4 (extremely). The OCI-R demonstrates good psychometric properties and a cut off point of 21 has been developed by Foa et al (2002) to distinguish OCD patients from non anxious controls.

Clark-Beck Obsessive Compulsive Inventory - Obsessional Intrusions Subscale (CBOCI; Clark & Beck, 2002)

The CBOCI is a 25 item screen for the frequency and severity of DSM-IV obsessive and compulsive symptoms which has also been designed to compliment the BDI-II. The CBOCI consists of validated subscales for obsessions and compulsions with each item rated on a 4 point scale (0-3). The measure demonstrates excellent internal consistency, good convergent validity and adequately distinguishes between clinical and non clinical individuals.

The Beck Depression Inventory- Second Edition (BDI-II; Beck, Steer & Brown, 1996)

The BDI-II is a 21 item measure of the frequency and severity of depressive symptoms on a 4 point scale. The BDI-II is widely used and demonstrates good psychometric properties.

Revised Obsessive Intrusions Inventory (ROII; Purdon & Clark, 1994)

The ROII is questionnaire consisting of 3 parts to assess the frequency, appraisal and control of obsessive thoughts in non clinical samples. Part I consists of 52 items on a 7 point scale to assess frequency of obsessive thoughts. Part II and III consists of 10 items, on a 5 point frequency scale from 0 (never) to 5 (always) to assess the appraisal and control of obsessional thoughts.

Thought Control Questionnaire (TCQ; Wells and Davies, 1994)

The TCQ is a 30 item questionnaire to assess frequency of thought control strategies on a 4 point scale from 1 (never use) to 4 (almost always use). The TCQ has 5 subscales (worry, distraction, punishment, social support and reappraisal). Subscales possess adequate internal consistency (Wells & Davies, 1994).

Frequency of intrusive thoughts

A golf tally counter will be used to measure the frequency of intrusive thoughts which has been used in similar studies (e.g. McLean & Broomfield, 2007; Marks & Woods, 2005).

Appraisal and Distress Ratings

100 mm Visual Analogue Scales (VAS) will be used to assess various details including distress and appraisals. A VAS consists of a 100mm horizontal line, anchored with descriptors at each end, such as 'not at all' to 'extremely'. Participants rate questions along this line with the VAS score determined by measuring the distance between the start of the line and the participants rating. VAS items will consist of thought appraisals (based on Part II of the ROII, Purdon & Clark, 2004) and

distress levels of obsessional thoughts. Daily visual analogue scales will be completed in relation to thought duration, thought dismissability, distress, suppression failure and acceptability of intrusive thought. Compliance with experimental instructions will also be measured through VAS ratings of suppression effort. See appendix IV & V for details.

3.5 Design

The study is a parallel controlled experimental design with participants assigned to either a suppression or mention condition (see appendix I). The study is a mixed model with the primary dependent variable being thought frequency, however, effects on thought dismissability and distress will also be investigated over a 1 week period, between and within groups.

3.6 Research Procedures

The study will be conducted over 1 week and will consist of 2 experimental sessions one week apart. Both sessions will involve meeting participants on a one to one basis, for approximately 30 minutes.

Session 1

Measures and Identification of Intrusive Thought

Participants will be screened for obsessionality using the obsessional intrusions subscale of the CBOCI (Clark & Beck, 2002) and those meeting inclusion criteria will be invited to meet with the researcher. The OCI-R (Foa et al, 2002) and the BDI-II (Beck et al, 1996) will be completed upon intake to the study. Participants will be asked to rate their current mood and fill out a practice VAS item. They will then be given a brief description of an intrusive thought (appendix III) and asked to complete overall intrusive thought VAS items (appendix IV). Participants will then identify a personally relevant intrusive thought experienced within the last week and which is likely to be still bothering them in one weeks time. Should participants have difficulty identifying a personally relevant intrusive thought, part one of the ROII (Purdon & Clark, 1994) will be completed to facilitate identification of a target intrusive thought. Participants will complete a priming exercise where by

they will be asked to spend 30 seconds thinking about their chosen thought. A mood rating will then be completed and participants will be asked how easy it was to bring their chosen intrusive thought to mind and keep it there on a 100mm VAS. Specific intrusive thought VAS ratings will then be completed (appendix V).

Thought Monitoring

Participants will then be given a golf tally and instructed to keep this with them at all times for the next week. Participants will be instructed to record the daily frequency of their target intrusion using the golf tally.

Diary

Participants will be given a daily diary to record daily thought frequency and VAS items.

Suppression and Mention Groups

Participants will then be randomly assigned to either a suppression or mention group. Randomisation will be completed from a randomisation schedule based on computerised random number generation. Both suppression and mention groups will be given monitoring instructions based on those by Salkovskis and Campbell (1994) followed by specific instructions for each group sent via text message throughout the week. On day 3 suppression instructions will be sent to the experimental group and monitoring instructions sent to the control group. On day 5, both groups will be sent monitoring instructions to be continued until the end of the experiment. See appendix VI.

Session 2

Participants will complete the same measures from the start of session 1 (anxiety levels and overall intrusive thoughts VAS). They will then be asked to think of their chosen intrusive thought for 30s and will complete specific intrusive thoughts VAS items. Participants suppression strategy over the

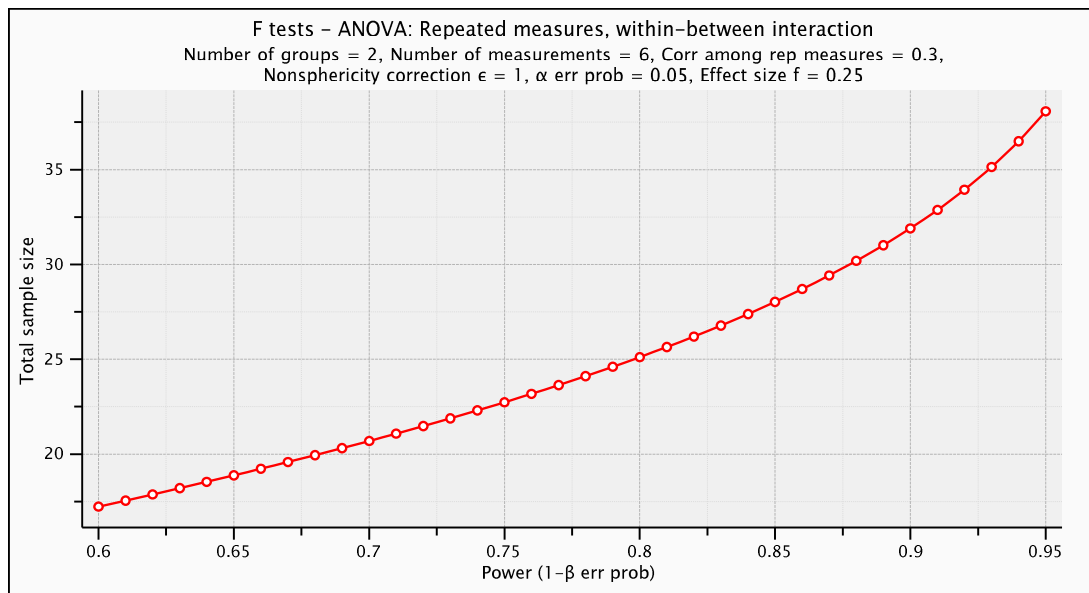
course of the experiment will be assessed using a modified version of the Thought Control Questionnaire (Wells & Davies, 1994).

The researcher will ask a series of open ended questions regarding the experimental week, including whether the intrusive thought is still a current concern. The accuracy of the tally counter scores in measuring participants thought frequency will be rated from 0-100% (with 0% being completely inaccurate and 100% being perfect). It will be checked that both text message instructions were received during the experimental week. Participants will then be debriefed and thanked for their participation in the study.

3.7 Justification of Sample Size

Power calculations were completed (G-POWER; Erdfelder, Faul, & Buchner, 1996) to determine the required sample size based on the primary hypothesis. The hypothesis predicts a significant effect of experimental group (suppression, mention) on thought frequency over 6 time points using a repeated measures analysis of variance (ANOVA). Methodology used in previous research was not sufficiently comparable to estimate effect sizes for the current study. Therefore, Cohen's effect size (f) conventions for ANOVA (Cohen, 1977, 1988) were used with values for f of 0.1, 0.25 and 0.4 corresponding to "small", "medium" and "large" effect sizes, respectively. The following assumptions were made; rho was conservatively predicted to be 0.3, correlations between all possible pairs of repeated measures would be identical (as assumed with repeated measures ANOVA) and significance level was taken to be 0.05. Results indicated that for assumed "medium" effect sizes, a sample size of 40 would have more than adequate power (0.96; >0.80) to detect the hypothesised effects.

Figure 1: Graph of Power vs. Sample Size for Repeated Measures ANOVA



3.8 Settings and Equipment

The study will be conducted in participants own environment, however, will include two, private 1:1 meetings with the researcher on the university campus. Equipment required for participants will include measures and visual analogue scales (see section 3.4), a daily diary and a tally counter. The researcher will require a mobile phone to contact participants throughout the study.

3.9 Data Analysis

Raw data will be anonymously stored and analysed using the Statistical Package for the Social Sciences (SPSS). Raw data will be tested for normality and where appropriate will be analysed using t -tests and repeated measures ANOVA. Non parametric tests may be used should data be unsuitable for parametric analysis. All significance tests will be 2 tailed and a significance threshold of $p=0.05$ will be implemented.

To ensure a correct random assignment to groups, pre experimental differences between groups will be analysed for demographics (gender and age), symptom scores (OCI-R, CBOCI and BDI-II), baseline intrusive thought frequency and baseline intrusive thought appraisal ratings using *t*-tests for continuous data and Pearson's chi-square (χ^2) test for categorical data.

Suppression effort ratings will be analysed using a repeated measures ANOVA to ensure that the suppression effort in the experimental group exceeds that of the control group.

The hypothesised effects of thought suppression on thought frequency, distress and dismissability will be analysed using repeated measures ANOVA. Should main effects be significant, multiple comparisons will be carried out using paired *t*-tests and Bonferroni correction. Simple effect analyses will be used to investigate significant interactions between subject group and a within subjects factor. Within subjects effects will be analysed using repeated measure ANOVA and between subjects simple effects will be analysed using one way ANOVA. Correlational analysis will be conducted to investigate associations between distress and intrusive thought appraisals and between distress and thought control strategy.

4. Health and Safety Issues

It is not anticipated that there will be any risks to the researcher whilst conducting the study. Meetings with participants will be conducted on the university campus, within staffed areas and will occur within standard working hours (9am to 5pm). It is proposed that meetings may take place at the University Health Service or the Public Health Research Centre.

It is not anticipated the participants will suffer any adverse effects from participation. Participants will be asked to monitor their intrusive thoughts and it is expected that this may be uncomfortable for a short time. This possibility will be explained to participants in the information sheet provided. It will be explained that their participation is voluntary and that they will be free to withdraw from the

study at any time. The methodology has been used previously with no serious long term effects reported.

5. Ethical Issues

Ethical approval will be sought from the University of Glasgow Ethics Committee and NHS Research and Development. It is expected that the study will be well tolerated and poses no risk or harm to participants. Should any participant present with significant difficulties before commencement of the experiment or during the experiment (e.g. severe depression) they will be advised not to participate. The standard boundaries of confidentiality and informed consent will apply and therefore should risk issues arise during the study, participants GP will be informed. Any contact with GPs will always be discussed with the participant before hand. The participant information sheet will detail these issues to potential participants.

6. Practical Applications

Thought suppression is one of a range of processes which individuals with Obsessive Compulsive Disorder employ to gain control over their own cognitive function. Treatments of OCD widely demonstrate to patients the paradoxical consequences of thought suppression on thought frequency (e.g. the “white bear” experiment), yet the research evidence to support this specific effect is still questionable. Clinically, it is important that we know *why* thought suppression is maladaptive. This study may provide an important contribution to the thought suppression literature by providing evidence on the effects of thought suppression in a naturalistic setting. It is hoped that results will contribute to the literature base and also provide implications for the treatment of OCD.

7. Timescale

Ethics application to be submitted – July 2010

Ethics approval to be obtained by – September 2010

Recruitment / Data collection to commence – September / October 2010

Draft Thesis- June 2011

Submission – July 2011

8. Financial Costs*

The Beck Depression Inventory- Second Edition (BDI-II): £98.70

Clark-Beck Obsessive Compulsive Inventory (CBOCI): £101.06

Paper, Printing & Photocopying Costs: £42

Mobile phone SIM Card: £10 & Phone Usage Estimate: £30

Total cost: £271.76

References

Please note: no additional references have been cited that are not included in the Major Research Chapter Reference section. Please refer to reference section on p77.